40 YEARS OF RESEARCH AT THE COLLEGE OF OPTOMETRISTS

THE COLLEGE OF OPTOMETRISTS

Professional Excellence in Eye Health

40 YEARS OF RESEARCH AT THE COLLEGE OF OPTOMETRISTS

CONTENTS

FOREWORD

Professor Edward Mallen BSc PhD MCOptom
College Research Committee Chair

Research informs the evidence base for all healthcare professionals. It forms the foundation of our clinical and professional practice as optometrists, is the key driver for developing new models for eye care, and informs our work to eradicate preventable sight loss.

The College performs a leading role in developing the evidence that underpins optometric practice, embedding insight and evidence into the profession. We do this by funding research projects at universities, in practice settings and commissioning specific research projects on priority topics through tailored calls or received proposals, which meet the needs of patients, carers and eye health professionals. This translates into £5 million invested in optometry, optics, vision science and eye health sector public policy research, £1million spent on 20 commissioned and collaborative research projects to date and £700,000 of research funding won for projects the College has been a partner in, over the last 40 years. We also produce research journals, Ophthalmic and Physiological Optics (OPO) the top-ranked optometry journal in the world, and Optometry in Practice (OIP), supported by engaging podcasts, which keep optometrists up to date with current research and developments in optometric practice.

Each College-supported research project makes an incremental impact on our profession, but there are a number of ground-breaking College-funded studies that have significantly changed optometry, improved patient care, and advanced our profession immeasurably, including:

- The ProVIDe (Prevalence of Visual impairment in Dementia) study, which found a disproportionately high prevalence of all types of visual impairment in older people with dementia, as well as evidence that carers and care workers underestimated how much may be achieved in an eye examination, and that people with dementia and their carers were unaware of domiciliary sight test availability. These findings formed the basis for a series of proposals on how eye examinations, treatment and care for people with dementia can be improved, which have informed the College's Guidance for Professional Practice, and led to the development of a number of clinical and professional resources for healthcare professionals and care providers.

- Northern Ireland Childhood Errors of Refraction (NICER) study, a partly College-funded project which found that the number of children who are myopic in the UK has doubled over the last 50 years (7.2% vs 16.4%). Myopia has been recognised as a significant public health concern by the World Health Organisation. The team of researchers at Ulster University investigated refractive development in childhood and early adulthood and found that children in the UK are becoming myopic at a younger age than in previous generations. As a result of NICER research, optometrists are able to deliver informed, more targeted and timely care. Also, undergraduate and postgraduate optometric curricula have been updated to include NICER outcomes - ensuring that emerging professionals have up-to-date knowledge.

- The Enhanced Scheme Evaluation Project (ESEP), which looked at the escalating problems in delivering emergency and routine eye care services in the UK, and the urgent need to manage the flow of patients between primary and secondary care. It demonstrated that community optometrists are able to provide specialist services that match care in hospital eye departments, while maintaining or improving the quality of outcomes for patients. ESEP findings have influenced national ophthalmic service redesign through the commissioning of optometrist-delivered specialist services, and played a major role in building the business case for Local Optical Committees (LOCs) to influence the decision of Clinical Commissioning Groups (CCGs) to adopt MECS (Minor Eye Conditions Scheme) and GRFS (Glaucoma Referral Filtering Scheme).

We ensure that high quality, ground-breaking research like these projects will continue by supporting future generations of researchers. We have provided more than 350 research funding awards (scholarships, research fellowships, small grants and bursaries) since 1980. Today, 56% of the postgraduate scholars who were supported by the College now work in academia or another research environment, 22.92% work in primary care and 23% work in hospital optometry. We also inspire and recognise research talent and ability through our Research Excellence Awards, which also raise the profile of their work among fellow eye health professionals, the wider vision sector, and among the general public.

As a researcher, I feel strongly that we need to celebrate our research achievements and our talented researchers! 40 Years of Research at The College of Optometrists not only does that, but it also demonstrates the significant impact that College supported research has had on the profession, on our practice and on the furtherance of reducing preventable vision loss for all. As well as outlining a history of the College's involvement in research, it brings together a wide range of case studies and research projects that are not only fascinating to explore but also show how research projects, large and small, have transformed our profession and practice over the past 40 years.

This is a truly illuminating and informative document. I am sure that you will enjoy reading it as much as I did, and hope that it will perhaps inspire you to get involved in research at the College – whether it be to listen to a podcast or attend a research webinar, undertake a project of your own or nominate a talented individual for a Research Excellence Award.

SECTION 1

RESEARCH AT THE COLLEGE

1.1 Why we support research

The College of Optometrists is the professional body for optometrists in the UK. It qualifies the profession and delivers the guidance, development and training to ensure optometrists provide the best possible care to the public. Research is a vital element to the College's new five year strategic plan, and its vision to put optometrists at the forefront of better eye health and vision for all. It also underpins our purpose, strategic pillars, and our foundations – our members, our values, our people and our resources. This report gives an overview of our strategic approach to funding research, the projects and researchers we have supported, and the successes we have recorded so far.

Research is a core responsibility of the College. We raise standards of optometric education and practice by providing the evidence base for optometry and related subjects through our delivery, commissioning and support for essential research in the field. Research underpins the College's extensive portfolio of evidence-based guidance and information for members, including the Guidance for Professional Practice, Clinical Management Guidelines, Using Evidence in Practice information sheets for interventions, and the College's consultation responses to sector and government organisations.

The College inspires and supports optometrists to excel in the provision of eye health care, always for the benefit of patients. We do this through promoting lifelong learning and career advancement, effectively amplifying the expert voice of optometrists, and defining and supporting good clinical practice. Many of the researchers who the College has supported over the last 40 years have gone on to become the educators and leaders of the profession, nationally and internationally.

We achieve this through our strategic pillars:

Defining and inspiring excellence in optometry.

Enabling optometrists to maximise their skills and develop their careers.

Representing and amplifying the expert voices of optometrists.

Embedding insight and evidence at the centre of the profession.

Throughout the next five years and beyond, we will continue collaborating with members, policy-makers, partners and patients to ensure we are making effective progress towards our vision for optometry.

1.2 How we support research

The College's support and funding for research is established by the objects of the College and the objects of the Research Fund (restricted). Section 2 summarises our current research funding streams and areas of work.

The College is established as a transformative source of research funding for optometry and vision science, supporting research that will improve the profession for the public benefit in university, hospital and practice settings, and developing the researchers of the future. The research strategy guides our research activity and leadership – funding, supporting and commissioning research and collaborating with key partners on research projects.

The research strategy is developed and implemented by the research team and monitored by the Research Committee; the latter determines the College's research priorities and makes

recommendations for the College's research spending. The overall aim is to ensure that the profession of optometry and the practice of our members, is evidence-based.

Our new research strategy (2020-2025), outlined in Section 4, articulates how our research priorities and activities will develop and grow the evidence base and body of knowledge that optometrists rely on every day in clinical practice.

1.3 A brief history of research at the College

The history of College research pre-dates the founding of the modern day College in 1980, when the British College of Ophthalmic Opticians was established by three separate bodies: the former British Optical Association (BOA), the Scottish Association of Opticians, and the Worshipful Company of Spectacle Makers. Upon its foundation, the College continued two key research activities of the BOA: publishing a research journal (The British Journal of Physiological Optics, first published in 1925) and providing funding for research students in university optometry departments, which the BOA had done since at least the 1950s. When the College made the important decision to carry on these activities (renaming the journal Ophthalmic & Physiological Optics), honouring the BOA's existing commitments to postgraduate students, and committing to award new postgraduate (PhD) scholarships annually, the cornerstones of College research were firmly established.

Over time, research activity at the College has been funded by a combination of donations, investment income, external research funding income (grants) and by a hypothecation of membership fees. Currently, the College funds research primarily through the Research Fund and by grants awarded by external research funding organisations. Donations to the Research Fund are accepted, and there is no hypothecation of College membership fees.

The very first College Council envisaged the creation of a 'research support fund,' and the present-day Research Fund was established by a generous donation in 1982. By 1987, the British College of Optometrists, as it was then known, established the Academic Committee with responsibility for allocating funding to scholarships, small grants for research equipment, and a Travelling Bursary Fund to enable students to present research at international conferences.

In the mid-1990s, the Council undertook a major review of the College's research policy, and concluded that research should not be limited to a specific academic area, but rather funds should be invested in both scholarships and research areas of contemporary interest. From 1997, the Research Fund has funded short-term ad hoc research projects subject to the content falling within the objects of the College and the fund.

The objects of the Research Fund (restricted):

1. The objects for which the College holds the fund are advancement for the public benefit of the study of and research into ophthalmic optics and related subjects and the publication of the useful results of such study in research.

2. In the promotion of the objects, the College shall have as a priority but shall not be limited to:

    a) the funding on a continuing basis of annual Postgraduate Scholarships at training institutions approved under section 12 of the Opticians Act 1989 (or any statutory amendment or re-enactment) and
    b) the encouragement of research, which relates to the promotion and improvement for the public benefit of the science and practice of ophthalmic optics.

3. The College must use the income and may use the capital of the fund in promoting the objects.

By the early 2000s, the College had agreed to allocate part of the income generated by the Research Fund to practice-based research. In 2005, research was designated a separate committee of the College Board, and in 2008, the first Head of Research was appointed, to work closely with the newly established committee, and sector research and policy organisations, to develop the College's first research strategy.

Today, the research team is supported by 3.5 FTE members of College staff: Director of Research, Head of Research, Research Manager, and Policy and Research Officer (0.5).

1.4 Timeline: Research governance, strategy and funding at the College

Pre-1980

1895 British Optical Association (BOA) established

1925 BOA first publishes a learned journal, The British Journal of Physiological Optics

1930 BOA begins offering research grants to institutions and students

1950s BOA begins providing financial support for postgraduate research in optometry and vision science

1980s

1980 On 1 March 1980, The British College of Ophthalmic Opticians (Optometrists) is established by three bodies, the BOA, the Scottish Association of Opticians, and the Worshipful Company of Spectaclemakers. The professional examining body for ophthalmic opticians, it is the foundation of today's College.

The new College continues to fund research students previously funded by the BOA and authorises the continuance of publication of the BOA's journal under the title Ophthalmic & Physiological Optics (OPO).

1982 Research Fund established by a generous anonymous donation, and conditions for research grants established: recipients must be a College Fellow or member, registered with the GOC and based in the UK; subject must be within the ambit of optometry and the work normally full time; preference given to those working for a higher academic qualification.

1986 Travelling Bursary Fund established to support College postgraduate scholars and other members undertaking research for a higher degree to present research papers at conferences abroad.

1987 The name of the College is changed to The British College of Optometrists.

1990s

1990 The College reached its goal of supporting at least one Postgraduate Scholarship in each of the (then six) university departments of optometry.

1995 The College adopted the name The College of Optometrists, after its Royal Charter was granted by Queen Elizabeth II.

The College agreed a new research funding policy to support areas of contemporary interest, such as screening for disease and vision and driving.

1997 Objects of the Research Fund redrafted:

1. The objects are advancement for the public benefit of the study of and research into ophthalmic optics and related subjects and the publication of the useful results of such study in research.

2. In the promotion of the objects the College shall have as a priority the funding of Postgraduate Scholarships and the encouragement of research relating to the promotion and improvement for the public benefit of the science and practice of ophthalmic optics.

The Research Fund began supporting short-term ad hoc research projects, subject to the content falling within the redrafted objects of the College.

1999 The first two Summer Research Scholarships (now known as Undergraduate Research Scholarships) were awarded to incoming third-year students.

2000s

2000 The College agrees to allocate part of the income generated by the Research Fund to practice-based research. Funds were set aside for epidemiological and primary care research and for research into referral outcomes.

2004 Under the new Chief Executive, research is named as one of five operational areas linked to the College's strategic aims.

2005 Research is designated a separate committee of the Board. The first priority was to establish an evidence base for the benefits of enhanced services linked to patients' needs.

For the first time, Postgraduate Scholars who have been awarded a PhD are celebrated at the annual Diploma Ceremony.

2006 The Research Committee widens its scope and focus with a new research strategy: to ensure that the Department of Health has the knowledge and information to base policy on evidence.

2007 The Innovation in Practice-based Research for Optometrists (IPRO) grant scheme was launched in February 2007 with the aim to encourage and support research by members within community practice.

By 2007, the College had provided over £800,000 in funding to PhD scholarships over the last 10 years. Committee meeting minutes noted that over 50% of scholars subsequently took up an academic position.

2008 The College establishes the research team. Michael Bowen (now Director of Research) appointed the first Head of Research. Two workshops held in January and May 2008 to develop the College's first five year research strategy.

The College awards the first three Research Fellowships.

2009 The first two commissioned and collaborative research projects commence under the new research strategy: The UK Eye Care Services Survey and The Optometric Workforce Survey.

2010s

2010 The first College Research Excellence Awards (REAs) are awarded: the Neil Charman Medal for Research, Philip Cole Prize for practice-based research, and the George Giles Postgraduate Research Prize.

IPRO is renamed the Small Grants Scheme, which aims to develop practice-based research, giving optometrists opportunities to develop research skills and contribute directly to the evidence base for optometric practice.

2011 REA portfolio expanded: the Bernard Gilmartin OPO Award and the Giles Van Colle Memorial Award for outstanding research or clinical case work relating to paediatric optometry (awarded in conjunction with the GVC Memorial Foundation).

2012 The Arthur Bennett Prize for outstanding research undertaken anywhere in the world becomes the newest REA.

2013 The inaugural President's Research Medal for outstanding contribution to research and recognising a lifetime's career in optometric/vision science research presented to Professor Larry Thibos, Emeritus Professor at Indiana University (USA). He delivers the Research Excellence Lecture on 3 Feb 2014.

2014 Research strategy 2014-2017 includes three core funding streams:

1. Scholarships and bursaries to support research, recognise excellence and develop the researchers of the future

2. Small grant funding for practice-based, applied research, and

3. Commissioned and collaborative research to inform College and national policy on all aspects of optometry and primary eye care services.

The College funds the first two Postdoctoral Research Awards.

2016 The College makes the first two Collaborative Research Awards.

The Naylor Prize for excellence in UK undergraduate projects and dissertations (first awarded in 1986) joins the College's portfolio of REAs. The Prize honours the optometry pioneer and former College examiner who completed the first UK PhD in optometry.

2018 Research strategy 2018-2020 aims to strengthen the College's position as a transformative source of funding, supporting optometry research to improve the profession for the public benefit in university, hospital and practice settings, and to develop the researchers of the future.

The College launches a fundraising campaign to fund a new postdoctoral researcher.

2019 The College begins supporting the UK National Eye-Health and Hearing Study (UKNEHS). The study will gather data to understand why people in the UK are losing their sight due to preventable causes and why people continue to live with correctable visual impairment and hearing loss. The College's Director of Research is a member of the leadership team and co-investigator.

The research team surveys all former postgraduate scholars who have completed a PhD since 1980.

2020s

2020 The College's 40th anniversary, the 95th anniversary of OPO, the 20th anniversary of Optometry in Practice (OiP) and the 10th anniversary of the Research Excellence Awards.

The College offers additional funding to postgraduate scholars to support them through disruption caused by COVID-19.

The College publishes a new five year strategic plan (2020-2025), which includes priorities for research.

2021 New five year research strategy published. Research will support the profession in meeting current and emerging challenges in four ways:

- Delivering evidence
- Increasing impact
- Translating research for practice
- Building research capacity.

SECTION 2

WHAT IS COLLEGE RESEARCH?

Over the past 40 years, the College has invested over £5m in optometry, optics, vision science and eye health sector public policy research. This section outlines the College's primary research activities and funding streams.

The College is building an evidence base for optometry and vision science by funding research through its diverse portfolio of research funding awards and the commissioned and collaborative research projects funding stream. We fund research in universities, hospitals and community practice settings, and commission projects led by experts on priority topics through tailored calls or received proposals.

The College disseminates high quality research, publishing two peer-reviewed research journals, the top-ranked optometry journal in the world, Ophthalmic & Physiological Optics, and the online CPD and CET journal, Optometry in Practice. The Research Excellence Awards recognise and celebrate outstanding optometry and vision science research.

The College plays a key leadership role in the eye health care and optometry and vision science research funding landscape – developing and supporting bids for external funding with partner organisations to undertake research to support members in providing the best care they can for patients, and help them meet the challenges of an evolving health care system in their daily practice.

Finally, the College provides practical research information, advice and guidance on all levels and types of research, in order to help members develop their expertise and gain the knowledge and skills they need to develop their careers. This is delivered with expertise from the research team staff, a small team of optometric research advisers based in UK university optometry departments, and a statistician.

2.1 Research funding awards

The College encourages and supports research into optometry and related subjects through scholarships, bursaries and awards to recognise research excellence, and making grants towards practice-based research.

The number of research funding awards has increased since the founding of the College when research funding was limited to a small number of PhD scholarships. The College has continuously provided financial support for students and other members to travel to present research at international conferences since 1986, currently by way of the Travel Bursaries. During the 1990s, research funding expanded to include support for third year undergraduate students to complete university-based projects and for standalone, short-term research projects in priority areas. These early initiatives developed over time into the current Undergraduate Research Scholarships and the commissioned and collaborative funding stream.

Supporting members to undertake practice-based research has long been at the heart of College research. From 2000, the Research Fund allocated grants for practice-based research. In 2007, the former Innovation in Practice-based Research for Optometrists (IPRO) was established and in 2010 this became known as the Small Grants Scheme. The Research Fellowships started in 2008 and the newest awards (awarded since 2014) are the Clinical Research Fellowships. The College also awards a best poster prize for research presented at its annual members' conference, Optometry Tomorrow.

The Research Committee reviews applications for the Postgraduate Scholarships, Undergraduate Research Scholarships and Travel Bursaries.

More about research funding awards:

- **Research and Clinical Research Fellowships:** career development awards to support early career researchers at hospitals and universities.
- **Postgraduate Scholarships:** funding for full-time and part-time PhDs in optometry and vision science, primarily at UK universities.
- **Undergraduate Research Scholarships:** funding for optometry undergraduates to conduct research projects at UK universities.
- **Travel Bursaries:** financial assistance for postgraduate students (not funded by the College) to attend and present research at national and international conferences.
- **Small Grants Scheme:** grants to support optometrists to undertake small, practice-based research projects, and provide them with advice on research methodology and statistics.

Research funding awards facts and figures

350

More than 350 research funding awards have been made across all categories since 1980

150

More than 150 postgraduate students have presented their research at national and international conferences

80

Approximately 80 undergraduate students have completed research projects

100

Since 2012, more than 100 research posters have been presented at Optometry Tomorrow

70

Over 70 PhDs have been funded by the College

10

Research has been funded at 10 UK optometry schools

Research Fellowships

The Research Fellowships are awarded annually to support postdoctoral research trainees, working as lecturers, to undertake research and make the transition to independent investigator. Funding enables Research Fellows to promote the establishment of a research laboratory; support an active current research project in any area of optometry where proof of concept is evident; or facilitate the acquisition of research funding from major grant awarding bodies. Funding may be used to buy equipment or cover teaching time.

The Clinical Research Fellowship enables staff in hospital settings to consolidate their research skills and make the transition from postdoctoral research trainee to proven independent investigator, by supporting an active research project or facilitating the acquisition of research funding. Hospital optometrists with a PhD are eligible to use funding for equipment or to cover clinical time.

Case studies of two former Research Fellows are included in Section 3 - How we know our research makes a difference.

Research Fellowships facts and figures

400k

Approximately £400,000 has been invested in Research Fellowships since 2008

15

15 Research and Clinical Research Fellowships have been awarded

8

Fellowships have funded researchers across 8 UK university optometry departments and hospitals

15

Research Fellows have published at least 15 peer-reviewed journal articles based on their Fellowship research

Postgraduate Scholarships

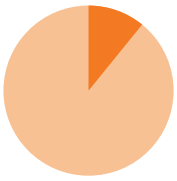
The College's highly competitive Postgraduate Scholarships support and enable research into optometry and related subjects, as well as providing optometrists with the opportunity to gain training in research methods leading to the awarding of a PhD. All postgraduate scholars are members of the College for the duration of the scholarship, and undertake research at UK university departments of optometry and vision science.

In 2019, the research team conducted a survey of former postgraduate scholars to learn about the impact of the College scholarship on recipients' research activity, skills, knowledge, experience and careers, and to find out if research funded by the College has influenced clinical practice, policy, or made a wider impact on society.

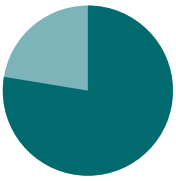
Highlights from the survey are included in Section 3, and Appendix 3 includes the questionnaire and an anonymised summary of responses. The survey received an 81% response rate and drew responses from former scholars working around the world, across all sectors and working environments: academia, hospital eye service, community optometry, and beyond.

Postgraduate Scholarships facts and figures

Since 1980 the College has awarded over 70 Postgraduate PhD Scholarships

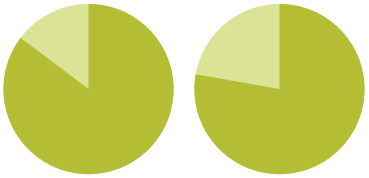


Over 10% of former scholars who responded are currently working outside the UK

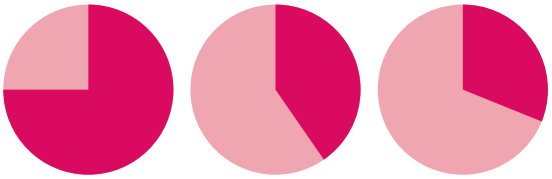


73.50% have authored CET/ CPD materials for optometrists

Over half (56.25%) of former scholars who responded to the survey reported working in academia or another research environment. Almost a quarter (22.91%) work in hospital optometry



Over three-quarters have taught undergraduate (83.67%) and/or postgraduate (77.55%) optometry students since completing their PhD



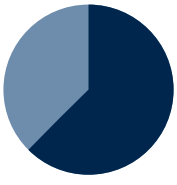
Clinical, patient-based research was the most common type of PhD research undertaken (75.51% of respondents), followed by basic research (40.82%) and research on new optometry techniques or practice (30.61%)

The Postgraduate Scholar Survey evidences the impact of research by College scholars:

- Of the 50 survey respondents, 92% have published papers in peer reviewed journals and 90% have presented research at national or international conferences.
- Since 1980, over 1,300 papers have been published by College scholars, and over 1,800 conference talks or posters presented.
- 89.13% of published scholars reported publishing or presenting material directly related to their PhD.
- Approximately 3 out of 5 survey respondents have gone on to receive additional research funding from national or international funders of scientific research after completing their PhD. Of those who received funding, almost one quarter (24.44%) received additional funding for research directly related to, or following on from their College scholarship.
- Over 77.42% of respondents said that their College-funded PhD led to new or improved non-research skills: analytical, critical thinking, communication and problem solving.

Scholars were asked about their activities influencing policy, clinical practice, patient care and their participation in public engagement related to research:

- 33.75% of respondents self- reported influencing clinical practice. Of those, 64.44% have spoken at CET and CPD events.
- Approximately 1 in 5 survey respondents reported policy influencing activities, including: participating in advisory committees and national consultations, providing advice to government, service commissions and healthcare leaders, and speaking at policymaking events.
- 64% of respondents reported participating in public engagement activities: delivering talks to public audiences, outreach with schools and teachers, and appearing on radio, television or podcasts.
- 28.89% of those who responded to a question about whether their research has had a direct impact on patient care believe that it has.



57.99% of respondents reported serving as a peer reviewer, and 23.99% have held or currently hold a role as editorial board member for a peer reviewed journal

43.48% of respondents have received honours or awards for research, teaching, clinical practice, or another professional activity

The most common areas of PhD research by scholars were:

- glaucoma
- myopia
- refractive error
- accommodation
- amblyopia
- childhood-onset eye disorders

Small Grants Scheme

The Small Grants Scheme (SGS) provides funding to enable College members to develop research expertise by undertaking small-scale, practice-based projects. It provides advice and guidance on all aspects of research project planning, undertaking and reporting through the support of the College research team, the College research advisers and a statistician.

The grants are awarded annually and are intended to support research that takes place in practice settings, rather than laboratory settings. Currently grants are made for funding up to £5,000 (with applications up to £7,000 considered in the case of exceptional quality).

The College research team is available to support applicants to develop proposals and applications, and strongly encourages all applicants to make use of the expertise and resources available by contacting the College prior to application to discuss their ideas.

Small Grants Scheme facts and figures

£235k — Over £235,000 awarded by the SGS since 2008 for more than 30 practice-based research projects

12 — Research funded across all 12 regions of the UK represented by College Council

10 — At least 10 articles published in peer-reviewed publications were based on research conducted as part of the SGS

5 — 5 SGS researchers have been awarded the Philip Cole Prize for excellence in practice-based research

Since 2007, over 30 small grants for practice-based research have been awarded to College members in all 12 regions of the UK represented by College Council. Areas of research include: evaluations of referral systems, optometrists' communication skills, the assessment of visual acuity in children, GOS service evaluations, audits and evaluations of community eye care schemes, independent prescribing, domiciliary sight tests, the impact of local commissioning policies, and the possible associations between spectacle use and falls.

SGS holders completed research in practice environments involving patients with a wide range of eye health conditions including AMD, astigmatism, cataract, diabetes, glaucoma, nystagmus, and ocular hypertension.

Five SGS researchers have been awarded the Philip Cole Prize for excellence in practice-based research:

- Dr Shelley Black undertook the research management, data collection, analysis and dissemination of the Special Education Eyecare (SEE) project. This project identified measurable benefits to children, teachers and parents of a sector-approved framework for in-school eye care for children in special education settings (joint award winner with Emma McConnell, 2020).
- Dr Peter Campbell's research compared clinical techniques for anterior chamber angle assessment, and assessed the relative merits for clinical practice (2015).
- Dr Ross Henderson conducted research into the GOIS arrangements in England and Scotland, and the impact on patient care (2014).
- Ms Shona Hadwin (now Redmond) researched the performance of optometrists in evaluating the appearance of optic disc images for the presence of glaucoma (2012).
- Dr Michael Beech undertook research to validate an online referral guide for melanocytic fundus lesions (2011).

Case studies of two former Small Grants Scheme award holders are included in Section 3.

2.2 Commissioned, collaborative and externally funded projects

For more than 10 years, the research team has managed a programme of commissioned and collaborative projects and established a track record of winning external research funding. Between 2009 and 2020, the College has undertaken more than 20 commissioned and collaborative or externally funded projects (see Appendix 1). These projects have all been run by and/or been financially supported by the College.

Projects are commissioned through two streams (one with open invitations to tender and one in which we collaborate with organisations or independent researchers) to inform College and national policy on all aspects of optometry and primary eye care services. The Research Committee reviews and approves proposals and tenders for commissioned and collaborative projects, undertaken by any combination of research team members, hospital or university-based optometrists, and independent researchers.

At the core of commissioned and collaborative research are the large and medium scale projects led by principal investigators at UK universities or hospitals, including the Enhanced Scheme Evaluation Project (ESEP) co-led by investigators at City, University of London and Manchester Royal Eye Hospital (2012 - present); phases three and four of the Northern Ireland Childhood Errors of Refraction (NICER) project at Ulster University (2012 - present); the second phase of the Aston Eye Study (2012-2018, Aston University), and a Novel Biomechanical and Computational Approach to Elucidate Presbyopia Development (2016 – present, Aston University). Earlier projects in this stream included An Evaluation of the Quality of Readymade Spectacles (2011) and the Online Spectacles Evaluation Project (2014), both run by the University of Bradford.

Commissioned and collaborative projects have provided opportunities for members at all stages of their careers to undertake research in partnership with institutions and funders. For example, two research optometrists became the College's first Ophthalmic Public Health Fellows. They undertook formal public health training at the University of Leeds, gathered evidence from clinical practice management systems and proposed a minimum data set for international primary care optometry which was published in the College's international research journal, OPO (2017).

As part of the College's first collaboration with Cochrane Eyes and Vision, two members joined established international review teams to update two systematic reviews with a particular optometric focus – 'Vision screening for correctable visual acuity deficits in school-age children and adolescents' and 'Reading aids for adults with low vision,' both published in the Cochrane Database of Systematic Reviews (2018).

A second major category of projects are those developed and run in-house by the College research team, often in collaboration with partners and independent researchers. Many of these aim to provide evidence to enable the College's policy team, and its external eye health care sector partners, to influence policymakers and inform clinical practice. Examples include two iterations of the Optical Workforce Survey (2010 and 2015), the UK Eye Care Services Study (2009), the Sight Loss and Vision Setting Priority Partnership (2012), and the Foresight Project on the future impact of technology (2016). The team also supports researchers to plan and disseminate surveys, often to the College membership, for example, the Clinical Practice Survey led by a College PhD scholar and the Hospital Eye Service Scope of Practice Survey; findings published in 2014 and 2015, respectively.

The Director of Research leads the College's applications for external funding. Funding from the National Institute for Health Research (NIHR), Economic and Social Research Council (ESRC), and the Department of Transport have produced the Prevalence of Visual Impairment in People with Dementia Study (PrOVIDe, 2012-2016); a collaboration with King's College London to investigate the communication skills of optometrists (2013); and a current research project on the impact of vision and road traffic with Warwick Medical School and the digital technology company Agilisys (2020-present). Relationships established with partner organisations have led to further collaborations, including a pilot project, Dementia Which Test is Best? with the UCL Dementia Research Centre (2015).

Commissioned, collaborative and externally-funded projects facts and figures

£700k

Partner in projects that have won over £700,000 of research funding

20

20 projects completed or are still currently active

8

8 projects led by principal researchers based at UK schools of optometry

£1m

Over £1m spent on commissioned and collaborative research projects to date

2

Findings from 2 projects launched with parliamentary receptions

43

43 research publications (and counting), including over 30 articles in 15 different peer-reviewed journals

Collaborations with university departments outside of optometry and vision science, including:

- King's College London Business School
- University of Leeds School of Medicine
- UCL Dementia Research Centre and Institute of Neurology
- University of Warwick Medical School

40

Collaborated with over 40 partner organisations including universities, hospitals, eye heath care sector bodies, independent researchers

£5k ▶ **£.5m**

Funding amounts for individual projects ranged from £5,000 to almost £500,000 each

6

6 projects fully or partially-funded by external funders including NIHR, ESRC, UK Department for Transport, and Johnson & Johnson Vision Care

2.3 Research Excellence Awards

The College's Research Excellence Awards (REAs) were launched 10 years ago to recognise achievements and celebrate outstanding contributions to research in the fields of optometry, optics and vision science. The REAs celebrate research conducted at universities, hospitals, and in practice settings. The awards have grown from the original three to the current portfolio of eight, including two awards for outstanding research anywhere in the world, the President's Research Medal and the Arthur Bennett Prize. Today, the REAs are among the most prestigious awards for optometric and vision science research in the world.

Since 2010, the College has presented over 60 awards across eight categories covering the life cycle of a researcher, from undergraduate to postgraduate, honouring an individual research paper, PhD research, or an entire lifetime's achievements. A full list of previous winners is available on the College website.

The world-class research and leadership recognised and celebrated by the REAs has made important contributions to the evidence base for optometry, optics and vision science. REA winners have investigated the physiology, epidemiology, treatments for, and genetic and environmental factors related to the development and progression of eye health conditions and diseases including: amblyopia, AMD, binocular vision function, dry eye, genetic retinal diseases, glaucoma, keratoconus, low vision, myopia, presbyopia, refractive error and stroke.

The research of Giles Van Colle Memorial Award winners has informed guidelines for the provision of effective eye care for children attending special schools, and to improve the examination of children's eye movements in clinical practice.

Research Excellence Awards explained:

- **The President's Research Medal:** awarded every four years for an outstanding contribution to research, recognising a lifetime's career in optometric or vision science research.
- **The Arthur Bennett Prize:** for outstanding research undertaken anywhere in the world, awarded every two years.
- **The Neil Charman Medal for Research:** annual award for outstanding research by a College member, honouring excellent research at postgraduate level or higher.
- **The Philip Cole Prize:** awarded annually for excellence in practice-based research by College members.
- **The Giles Van Colle Memorial Award:** presented bi-annually in conjunction with the Giles Van Colle Memorial Foundation for outstanding research or clinical case work relating to paediatric optometry.
- **The Bernard Gilmartin OPO Award:** annual award to recognise a paper published in Ophthalmic and Physiological Optics in the preceding five years.
- **The George Giles Postgraduate Research Prize:** award for outstanding PhD or Masters level research conducted by College members, made annually.
- **The Naylor Prize:** presented annually to recognise excellence in final year UK undergraduate optometry projects and dissertations.

The Research and Clinical Research Fellowships, Research Excellence Awards, and Small Grants Scheme awards are all made by separate selection panels of experts. The winner of the Bernard Gilmartin OPO Award is decided by the OPO Editorial Board.

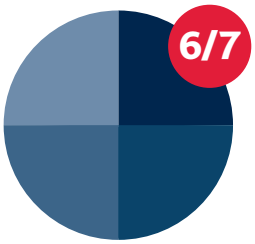
Research Excellence Awards facts and figures

4

REA winners represent research institutions from all four nations of the UK

£50k

In the past 10 years, the College has awarded over £50,000 to 60 REA winners based at research institutions from more than 10 countries, across four continents



6 of the 7 papers that have been awarded the Bernard Gilmartin OPO Award are ranked in the top 25% of all research outputs in the world by Altmetrics, which looks for mentions of research from many non-academic sources including social media, newspapers, policy documents, blogs and Wikipedia

2.5k

Over 2,500 newly-qualified optometrists have been inspired by REA winners and College Fellows as they were honoured at the annual Diploma Ceremony

500

Over 500 people have attended REA lectures, delivered by winners of the President's Research Medal and the Arthur Bennett Prize

2.4 Research publications: Ophthalmic & Physiological Optics and Optometry in Practice

First published in 1925, Ophthalmic & Physiological Optics (OPO) is the research journal of the College. OPO is an international, interdisciplinary journal that addresses basic and applied questions pertinent to contemporary research in vision science and optometry. Published bi-monthly online, OPO is free to all College members and is accessed through the College website or the dedicated OPO app. For the past six years, OPO has been the top-ranked international optometric research journal in the world.

Under the Editorship of Professor Mark Rosenfield MCOptom PhD FAAO, State University of New York (SUNY) College of Optometry, since summer 2020, the OPO Editorial Board currently consists of nine associate editors and 23 editorial board members. They represent 23 universities, hospitals, and research institutes from nine countries and more than 65% are based outside the UK. Included in their ranks are seven former College postgraduate scholars, including the current Editor-in-Chief. Professor Rosenfield will set out his plans for OPO in 2021. The fourteenth special issue of OPO, Seeing beyond 2020: refractive care and global inequalities in treatment accessibility, will be published in May 2021.

Led by the previous editors, Professors Elliott, Dickinson, Gilmartin and Charman, OPO has grown into a leading international interdisciplinary journal. It addresses basic and applied questions pertinent to contemporary research in vision science and optometry for researchers, educators and clinicians concerned with the development, use and restoration of vision.

OPO's influence on the evidence base for optometry is clear - publishing leading international research papers that are read and used by the lecturers that educate the next generation of optometrists and vision scientists. Highlights include high profile special issues, invited reviews and editorials. Recently, the guest editorial, 'COVID-19 and the eye,' (Lawrenson and Buckley, July 2020) summarised the evidence to date regarding the effects of COVID–19 on the eye and the implications of the ongoing pandemic for eye care practitioners.

The rise in the journal's impact is evidenced by both the Journal Citations Reports (JCR) release, published by the Web of Science Group, and in rankings from Scopus, Elsevier's abstract and citation database. Data published in 2020 show an increase in OPO's Journal Impact Factor (IF), which measures the average number of times articles from the previous two (or five) years are cited in scientific and social science journals within a given year. Since 2010, OPO has risen from the lower half of eye and vision journal rankings with an impact factor, to ranking consistently in the top third.

In June, College journal OPO achieved its highest two year impact factor (IF) for six years, and highest ever five year IF (2.62 and 3.10, respectively), demonstrating its national and international importance to optometrists, ophthalmologists and vision scientists, as articles are increasingly cited in the peer reviewed literature. It has been the top-ranked optometry journal in the world since 2014.

OPO metrics (2020):

- 2.62: 2-Year IF, an increase from 2.56 in 2019.
- 3.10: 5-year IF, up from 2.84 (the first time an optometry journal has had an IF over 3.0).
- Ranked 18/60 in Ophthalmology: 2-Year JCR IF ranking.
- Ranked 15/60 in Ophthalmology (Quartile 1): 5-year JCR IF ranking.
- Current Article Influence (AI) score of 1.02. This is the first time an optometry journal has obtained an AI over 1, indicating an above average influence on the literature.
- Ranked 1/9 in Optometry; Quartile 1 rankings in 3 categories - Optometry, Ophthalmology and Sensory Systems: 2019 Elsevier Scopus rankings.

OPO special issues

January 2012
Volume 32, Issue 1
Ocular epidemiology and genetics

September 2012
Volume 32, Issue 5
Vision and IT displays: a whole new visual world

May 2013
Volume 33, Issue 3
Understanding and controlling myopia – where we are now. A compilation to honour the research achievements and mark the passing of Josh Wallman

July 2013
Volume 33, Issue 4
Visual and physiological optics

March 2014
Volume 34, Issue 2
Binocular vision: from laboratory to clinic

July 2014
Volume 34, Issue 4
The ageing visual system

March 2015
Volume 35, Issue 2
Glaucoma: basic science and clinical translation

November 2015
Volume 35, Issue 6
OPO's 90th anniversary

January 2016
Volume 36, Issue 1
Presbyopia: physiology, prevention and pathways to correction

May 2016
Volume 36, Issue 3
Imaging the visual system: from the eye to the brain

May 2017
Volume 37, Issue 3
Visual and physiological optics

May 2018
Volume 38, Issue 3
Myopia: mechanisms, manifestations and management

March 2020
Volume 40, Issue 2
The Ida Mann 2020 special issue

May 2021
Volume 41, Issue 3
Seeing beyond 2020

Optometry in Practice

The College encourages practitioners to achieve higher standards than they have gained at entry to the profession, and to pursue a range of training and development opportunities that complements their practice. As part of this, Optometry in Practice (OiP) is the College's online quarterly continuing education and training (CET) and continuing professional development (CPD) journal.

Originally a CET journal, today OiP publishes both CPD and CET articles; the combination of the two has broadened the publication's coverage and its appeal to practitioners. OiP articles highlight the latest research, analysis and opinions on a range of topics and include commissioned, authoritative reviews of key topics of practical relevance to optometrists in community and in hospital practice.

The Editor-in-Chief is Aston University Professor Leon Davies FCOptom PhD FAAO SFHEA, College Vice President and Council Member for the West Midlands. Professor Davies was a recipient of the inaugural College of Optometrists Research Fellowship Award and the inaugural Neil Charman Medal for research in optometry, optics and vision science.

With a reputation for publishing quality CET built over its 20 year history, the practice-based journal is distributed to all members of the College (including all pre-registration optometrists) as part of the College member benefits. OiP is also distributed to undergraduate optometry students via their university departments.

OiP articles are peer-reviewed and CET accredited. The CET response rate is 10-25% of the eligible readership for each article. Approximately four CET points are available from each issue. OiP is predominantly a journal for optometrists, although accreditation for contact lens opticians and dispensing opticians is often available.

The College's podcast programme regularly includes episodes featuring the OiP Editor-in-Chief interviewing authors of published papers. Recent OiP podcast topics include 'Lissamine green – where have we been and where are we now?' and the use of optical coherence tomography (OCT) in the detection and diagnosis of glaucoma, with practical advice on how OCT can be used by optometrists.

> OPO sits at the cutting edge of research in optometry and vision science worldwide. It is truly an international journal, and with the rapidly expanding scope of practice, provides an evidence base for new developments in critical eye care. The inclusion of basic and translational research may lead to novel treatments of ocular conditions in the future."

Professor Mark Rosenfield, Editor-in-Chief

College research journals timeline

1925	BOA first publishes a learned journal, The British Journal of Physiological Optics
1980	The College continues publication of the BOA's journal under the title Ophthalmic & Physiological Optics (OPO). Professor Neil Charman is appointed the first Editor of OPO.
1982	Number of OPO issues published per year increases from three to four.
1987	Professor Bernard Gilmartin appointed Editor of OPO.
1996	OPO Editor became the Editor-in-Chief. Editors in six subject areas appointed to provide specialist advice and support for peer review.
1998	OPO introduces new editorial format and design, to include editorials on current issues in clinical or academic optometry.
1999	Professor Christine Dickinson appointed Editor-in-Chief of OPO.
2000	The first issue of Optometry in Practice (OiP), the College's CPD/CET journal, is published.
2002	OPO made freely available online to College members.
2007	OPO now published six times per year; OiP published four times per year.
2010	Professor David Elliott named Editor-in-Chief of OPO.
2011	First virtual issue of OPO published (on myopia and its causes). The first Bernard Gilmartin OPO Award is presented as part of the annual Research Excellence Awards. It recognises a highly regarded paper published in OPO in the preceding five years, as selected by the Editorial Board.
2012	The first special issue of OPO is published in January 2012, on the topic of ocular epidemiology and genetics.
2014	OPO becomes the top-ranked optometric research journal in the world.
2015	The College celebrates the OPO 90th anniversary with a reception at the 2015 ARVO Annual Meeting in Denver (USA). ARVO is the world's largest eye and vision research organisation.
2016	OPO app launched, providing free access to all journal content for College members.
2018	Professor Leon Davies named Editor-in-Chief of OiP, succeeding founding Editor Steve Parrish after 18 years. OiP moves to an online-only format focussing on innovative content and delivering research-led CPD material.
2019	Professor David Elliott awarded FCOptom for his outstanding contributions as Editor-in-Chief of OPO.
2020	The 95th anniversary of OPO and the 20th anniversary of OiP. OPO achieves its highest two and five year Impact Factors ever. It remains the top-ranked optometry journal and is ranked in the top 25% of ophthalmology and sensory systems journals. Professor Mark Rosenfield appointed the fifth Editor-in-Chief of OPO.
2021	From January 2021 OPO is published in an online-only format. Special issue of OPO, Seeing beyond 2020 will be published in May 2021.

SECTION 3

HOW WE KNOW OUR RESEARCH MAKES A DIFFERENCE

3.1 The impact of College research

There are many examples of College-funded research making a difference across all funding streams, spanning 40 years. This section features a timeline of highlights from College research collaborations and public engagement, and presents a series of case studies demonstrating how College-funded research across all funding streams and programmes has made a difference.

The eight case studies are primarily spread across the categories of commissioned, collaborative and externally-funded projects; College Fellowships (research and clinical research); and Small Grants Scheme awards. However, the researchers involved often span multiple categories; for example, principal investigators may be former Postgraduate Scholars, and Fellows and grant holders may also be Research Excellence Award winners.

The timeline and case studies include examples of College research making a difference across five areas of impact:

- Supporting optometrists over the whole lifecycle of their career.
- Developing and supporting optometry leaders, researchers, and clinicians.
- Building networks, collaborations and partnerships.
- Influencing policymakers and changing policy.
- Informing clinical practice and improving patient care.

3.2 Highlights from College research collaborations and engagement

1997 The Research Fund began supporting research projects, subject to the content falling within the objects of the College.

2001 The College conducts the first optometric Clinical Practice Survey.

2002 The joint College and AOP competition to design and produce a working prototype of an affordable device that could replicate the vocational colour vision lanterns test awards a prize to Professor Emeritus Robert Fletcher. This led to the development of the Fletcher-Evans CAM lamp.

2007 Partnership with Moorfields Eye Hospital established to develop the Eyes and Vision Research Network (EVRN) with the aim of building a comprehensive database of eye and vision research.

2009 The first Research Symposium takes place at the annual College conference, Optometry Tomorrow; including oral and poster research presentations.

2012 The College funds two Ophthalmic Public Health Fellows at the University of Leeds.

The College is awarded a £460,000 NIHR grant to investigate the Prevalence of Visual Impairment in People with Dementia (the PrOVIDe project).

2013 The report of the Sight Loss and Vision Priority Setting Partnership (SLVPSP) launched at the House of Lords. Co-funded and supported by the College, the SLVPSP identified and prioritised unanswered questions about the prevention, diagnosis and treatment of sight loss and eye conditions.

Co-funded by the College and the Economic and Social Research Council (ESRC), researchers from King's College London begin to investigate the communication skills of optometrists.

2014 Findings from the first research project co-funded by the College and a commercial partner (Johnson & Johnson Vision Care) published: 'A survey of UK contact lens practice for children and young people'.

2015 The College and its PrOVIDe partners Thomas Pocklington Trust and Alzheimer's UK hold the Visual Impairment and Dementia Summit (VIDem) in London, 24 Feb 2015. Report published by the College (March 2016).

2016 In January 2016, the College publishes the report of the first sector-wide Optical Workforce Survey (OWS), conducted in 2015 in collaboration with key eye health sector bodies.

Director of Research presents the College-funded research 'Big data and primary eye care: road accident reporting data and vision in the UK,' as a session at the ARVO Annual Meeting in Seattle (USA), 4 May 2016.

29 Sept 2016: the College hosts a roundtable, 'The optical professions: what does the future hold?' to discuss findings of the OWS and the College-commissioned Foresight report on the potential impact of technology on the optical sector to 2030. Sector leaders identified key areas for action related to technology; regulation, training and scope of practice; and the changing demographics of the profession.

2017 Parliamentary reception held on 2 May 2017 to raise awareness of issues highlighted by the PrOVIDe report attended by MPs, key government bodies, patient groups and researchers.

2018 Two updated reviews funded by the College published in the Cochrane Database of Systematic Reviews: Vison screening for children and adolescents (Feb 2018) and reading aids for adults with low vision (Apr 2018).

2019 The College published gender pay gap analysis, a follow up to issues raised by the 2016 OWS (March 2019).

2020 College awarded a £54,000 grant from the Department for Transport to carry out research on the impact of vision on road traffic accidents.

The College supports six research collaborations to collect data relating to COVID-19, eye health, and optometric practice, or to seek funding to carry out research relating to these areas.

BCOVS 2020: Virtually Everywhere (7-8 Sept). The College has supported/co-sponsored the annual British Congress of Optometry and Vision Science for over five years; for the first time, all College members were able to attend virtual sessions free of charge.

The Director of Research leads the College's engagement with the UK National Eye-Health and Hearing Study (UKNEHS) as Co-Investigator. Once funding is secured, the study will gather data to understand why people in the UK are losing their sight due to preventable causes, and why people continue to live with correctable visual impairment and hearing loss.

3.3 CASE STUDIES

Case Study 1

Project title:	The Enhanced Scheme Evaluation Project (ESEP)
Funded value:	c.£300,000
Funded period:	2012-2019
Funder:	The College of Optometrists
Funding stream:	Commissioned and Collaborative Projects
Project status:	Ongoing (due to finish 2021)
Principal investigators:	Professor John Lawrenson, former College Postgraduate Scholar 1987-91, City, University of London; Professor Robert Harper, Manchester Royal Eye Hospital
Co-investigators:	Professor David Edgar, Ms Cecilia Fenerty, Professor David Henson, Mr Ian Murdoch, Dr David Parkins, Dr Steve Roberts, Mr Paul Showman, Ms Fiona Spencer, Professor Matt Sutton, and Professor Heather Waterman
Research collaborators:	Dr Helen Baker, Dr Stephen Birch, Dr Hannah Forbes, Mr Patrick Gunn, Ms Sarah Janikoun, Dr Cheryl Jones, Dr Evgenia Konstantakopoulou, Ms Genevieve Larkin, Ms Joanne Marks, Dr Thomas Mason, and Mr Gokulan Ratnarajan

Summary of the research

The Enhanced Scheme Evaluation Project (ESEP) combined a systematic review with primary research evaluating different models of community-based eye care services in order to assess their clinical and cost-effectiveness. The enhanced eye care services (ESS) evaluated included a Minor Eye Conditions Scheme (MECS) in South East London and the Glaucoma Referral Filtering Scheme (GRFS) in Greater Manchester. This mixed-methods research used a combination of evidence synthesis using a systematic review methodology designed for complex policy interventions, and a detailed case study methodology.

The aim of the systematic review was to review the evidence on the effectiveness of services for cataract, glaucoma and primary eye care. In addition, the research team produced qualitative studies of stakeholder views, health economics analyses (retrospective economic analysis of the transfer of services from hospitals to the community), and quantitative evaluations of the clinical effectiveness and impact on hospital attendances following the introduction of ESS.

Why did the College fund this research?

The College funded this project in order to evaluate new models of community-based eye care that have the potential to reduce demand on the Hospital Eye Service by reducing unnecessary referrals and monitoring patients in the community. ESEP research addresses an escalating problem in the delivery of emergency and routine eye care services in the UK: the urgent need to manage the flow of patients between primary and secondary care and ensure that patients are seen by the most appropriate healthcare professional, in the most suitable setting, and in a timely manner in order to minimise the likelihood of visual loss.

Key findings:

- ESEP research has demonstrated that community optometrists are able to provide specialist services that match care in hospital eye departments, and work safely in defined areas of clinical practice to maintain or improve the quality of outcomes for patients.
- Detailed case-study evaluations of MECS and GRFS demonstrated clinical effectiveness, clinical safety, reduction in hospital attendances and waiting times, cost savings and high levels of patient satisfaction. For example, compared to a companion area without the scheme, MECS led to a differential reduction in GP referrals to hospital ophthalmology by 40-75% with an associated 14% reduction in unit costs[1].
- Similarly, GRFS resulted in a 53% reduction in the number of false positive glaucoma referrals with a false negative rate of <1%[2]. Reducing false positive referrals clearly benefits both the hospital and the patient.

Research impact:

- ESEP findings have influenced national ophthalmic service redesign through the commissioning of optometrist-delivered specialist services and played a major role in building the business case for Local Optical Committees (LOCs) to influence the decision of Clinical Commissioning Groups (CCGs) to adopt MECS and GRFS pathways.
- Outputs informed the Ophthalmic Services Guidance for Primary Eye Care, Community Ophthalmology and General Ophthalmology jointly developed by the College and the Royal College of Ophthalmologists (2019).
- Currently 71% of LOC regions in England operate a MECS service (compared to 55% in 2015) and over the same period an additional 4,000 optometrists have undertaken MECS accreditation[3]. The commissioning of MECS significantly impacts referral rates to secondary care, reducing the 1.7 million first attendances at ophthalmology outpatients by at least 10%; the equivalent of 170,000 HES appointments and net savings of £5.5million[4].
- In 2017, ESEP research was used as evidence for the clinical- and cost-effectiveness of MECS at policy roundtable discussions hosted by RNIB and Specsavers to explore how improving delivery in eye care services can help to increase capacity[5]. In 2016 Spesavers announced that more than 2,000 of its optometrists have become accredited to offer MECS in England[6].
- ESEP, together with previous research by the team, informed a recommendation from the NICE guideline committee for glaucoma that was incorporated into commissioning guidance: 'people planning eye care services should consider commissioning referral-filtering services (for example, repeat measures, enhanced case-finding, or referral refinement) for chronic open angle glaucoma and related conditions' (NICE Guideline 81)[7].

ESEP in numbers

1k

Findings presented to over 1,000 delegates and stakeholders at conferences and events

20+

Involved 20+ researchers (from across disciplines) spanning 11 institutions (universities, institutes, hospitals)

80

ESEP publications have been cited at least 80 times in peer reviewed journals (as of 6 October 2020)

8

8 papers published in peer-reviewed journals (2014-2019):

- the first systematic realist review of literature on ESS
- 2 qualitative studies of stakeholder views
- 2 evaluations of clinical effectiveness
- 2 health economics analyses (MECS and GRRS)
- 1 clinical safety review (MECS)

ESEP firsts

The first ever evidence synthesis on the effectiveness of ESS in the UK, published in the College's research journal, Ophthalmic & Physiological Optics (2016).

As part of ESEP, the Lambeth and Lewisham MECS was one of the first schemes to be comprehensively evaluated, both for clinical outcomes and effectiveness and by a retrospective economic analysis.

The second ESEP qualitative study was the first to describe the views and attitudes of key stakeholders on the operation of community-based enhanced optometric services.

ESEP produced one of the first and the largest false negative studies involving NICE aligned examination of non-referred cases within a GERS.

> It has been hugely rewarding to collaborate with a large multi-professional research team in making this contribution to the evidence base, with ESEP furnishing stakeholders, including commissioners, with key information to reduce uncertainty and better underpin the much needed expanded scope of practice within community optometry.

Professor Robert Harper, Principal Investigator

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1. Mason T, Jones C, Sutton M, et al. Retrospective economic analysis of the transfer of services from hospitals to the community: an application to an enhanced eye care service. *BMJ Open* 2017; 7: e014089.
2. Gunn PJG, Marks JR, Konstantakopoulou E, et al. Clinical effectiveness of the Manchester Glaucoma Enhanced Referral Scheme. *Br J Ophthalmol* 2019; 103: 1066-1071.
3. Ophthalmic Services Guidance: Primary Eye Care, Community Ophthalmology and General Ophthalmology (College of Optometrists and Royal College of Optometrists) college-optometrists.org
4. GIRFT ophthalmology national report (NHS Improvement) improvement.nhs.uk
5. The State of the Nation Eye Health 2017: A Year in Review rnib.org.uk
6. Over 2000 Specsavers optoms now MECS-accredited aop.org.uk
7. The Way Forward Glaucoma Report (Royal College of Ophthalmologists). rcophth.ac.uk

Case Study 2

Project title:	Northern Ireland Childhood Errors of Refraction Project (NICER)
Funded value:	**Postgraduate Scholarships:** £48,030 (NICER1), £50,466 (NICER2); **Commissioned Project:** £107,205 (NICER 3), £149,935 (NICER 4)
Funded period:	2005-2022
Funder:	The College of Optometrists
Funding stream:	Postgraduate Scholarships and Commissioned and Collaborative Projects
Project status:	Ongoing
Principal investigators:	Professor Kathryn Saunders, Ulster University (former College Postgraduate Scholar, 1990-1993)
Co-investigators:	Dr Julie McClelland (former College Postgraduate Scholar), Professor Nicola Logan, Aston University, Professor Alicja Rudnicka, St Georges, University of London
PhD researchers:	Dr Lisa O'Donoghue (2012 Neil Charman Medal for Research, former Postgraduate Scholar), Dr Karen Breslin (former Postgraduate Scholar)
Postdoctoral researchers:	Dr Sara McCullough, Dr Lesley Doyle (2019 Philip Cole Prize for practice-based research)

Summary of the research

The NICER study is the largest in the UK and Ireland to prospectively examine how children's eyes, in particular their refractive error, change through childhood and adolescence. In 2006, over a thousand 6-7 and 12-13-year-old schoolchildren were recruited and had their first vision assessment. Three, six and nine years after the initial assessment, each participant was invited to have these measures repeated. These data, spanning nine years, addressed a significant knowledge gap relating to the profile and progression of refractive errors among children living in the UK. The outcomes constitute the only robust contemporary data on myopia prevalence, onset, progression, and risk factors for this population.

Why is the research important?

The prevalence of myopia (short-sight) is increasing, and the World Health Organisation has recognised myopia and myopia-related eye disease as a significant public health concern. The rapid rise in myopia prevalence was first documented in Asian populations and myopia was not perceived as a concern in white populations. NICER research profiling myopia in white children has contributed significantly to the recognition of myopia as a serious pan-ethnic public health concern.

Key findings

- Nearly one in five teenagers in Northern Ireland are myopic.
- Teenagers in Northern Ireland are three times more likely to be myopic than comparable Australian teenagers, but not as likely to be myopic as Asian teenagers. The interplay between environment and genetics is to be important in determining how many children become myopic and how myopic they become.
- The number of children who are myopic in the UK has doubled over the last 50 years (7.2% vs 16.4%). Children in the UK are becoming myopic at a younger age than in previous generations and the development of myopia is most likely to occur during primary school years when children's eyes are growing most rapidly. Delaying the onset of myopia is a key factor in constraining the magnitude of myopic outcomes.
- Parental refractive error is an important risk factor for myopia; the NICER study found that a child's risk of myopia increased 2.9x and 7.8x with one and two myopic parents respectively (compared with a child with no myopic parents).
- Children with low levels of hyperopia (<+0.75D) and longer eyes (≥23.19mm) in early childhood (6-7 years old) are at greatest risk of developing myopia and are likely to develop myopia at an earlier age.
- Children's eyes grow through childhood. Children whose eyes show accelerated eye growth, greater than that expected for age, are more likely to develop myopia in the future than children with large eyes that grow in a more consistent fashion. This finding indicates that a child's eye size is less useful in predicting myopia than the pattern of growth the eye demonstrates.
- Hyperopia ≥+3.50D (spherical equivalent refraction) is persistent in individuals aged 6-7 through to 15-16 years and 12-13 through to 21-22 years.
- Few children in Northern Ireland have significant visual impairment. However, 25% of children needing glasses, do not routinely bring them to school and their vision is poorer because of this.
- Amblyopia prevalence that persisted beyond traditional treatment ages is approximately four times lower among children in Northern Ireland compared to children in Ireland. This finding highlights the value of comprehensive NHS-funded school vision screening in Northern Ireland and the provision of accessible, 'free at the point of delivery' primary eye care services in the UK.

NICER sub-studies funded by the College

- A study of visual outcomes of children passing/failing school vision screening evaluated, for the first time, the number of false negatives (1 in 13) resulting from vision screening and determined that using plus blurring lenses was not an effective way to detect significant uncorrected refractive errors in young schoolchildren.
- Retinoscopy results with and without 1% cyclopentolate in school-aged children were compared and the repeatability of cycloplegic retinoscopy was evaluated.
- Two College member surveys gained a better understanding of the attitudes of UK optometrists towards the use of cycloplegia and spectacle prescribing in children and opinions on childhood myopia.

Research impact

NICER study outcomes have directly influenced clinical practice, international research priorities and public health information regarding myopia.

Impact on the profession

- Because of NICER research, optometrists' knowledge regarding myopia and its current profile is more comprehensive and up to date, enabling them to deliver more targeted and timely care.
- The College and the Association of Optometrists have recognised the fundamental shift in clinical best-practice and patient expectation in relation to myopia. They have produced a range of resources utilising NICER study outcomes to increase optometrists' understanding of childhood myopia and how to proactively detect and manage the condition.
- Undergraduate and postgraduate optometric curricula have been updated to include NICER outcomes and ensure emerging professionals have up-to-date knowledge[2].

NICER in numbers

22

22 papers published in 9 different peer-reviewed journals so far (2010-2020)[1]

350

NICER publications have been cited at least 350 times in peer reviewed journals (as of 5 November 2020)

5

5 invited articles published in eye health sector press

9.3k

Since 2016, 'Six-year refractive change among white children and young adults: Evidence for significant increase in myopia among white UK children,' has been viewed or downloaded more than 9,300 times on PLOS and PubMed Central

10

10 invited research and professional presentations delivered to audiences in 6 different countries (including China, North America, and across Europe)

700

The most recent publication, 'Axial growth and refractive change in white European children and young adults: predictive factors for myopia,' (Scientific Reports, published 16 September 2020) was accessed over 700 times within the first few months of publication (as of 10 November 2020)

Impact on patients and the public

- Through application of NICER research by professional organisations and industry, eye healthcare practitioners are better placed to proactively manage myopia to the benefit of patients. Enhanced knowledge regarding the prevalence, expected age of onset and risk factors associated with modern myopia allows clinicians to more accurately target children at risk for myopia for earlier detection and treatment. Prompt detection and correction of myopia has been shown to improve visual and educational outcomes and offers more opportunity to apply emerging anti-myopia treatments.
- NICER study data have been used by CooperVision in promotional and instructional material to highlight to practitioners and patients the need for its 'anti-myopia' contact lens, MiSight®.[3] Since launching in the UK MiSight® uptake has been rapid: over 300 optometric practices have prescribed MiSight® to over 3,000 UK children since 2017. Worldwide, over 17,000 children have benefited.
- NICER study data have been used to educate the public regarding modern myopia, its development profile and the risk factors with which it is associated. In 2018, the NHS website updated their advice regarding childhood myopia to reflect the research findings, and The College's award-winning 'Look After Your Eyes' website uses NICER outcomes to inform parents about the increase in prevalence and earlier age of onset of modern childhood myopia.[4,5]
- Extensive coverage of NICER research in print and broadcast media including The Times, BBC Radio 4's Today Programme, BBC1's 'Health: Truth or Scare' and BBC Radio 5Live, has reached over 20 million individuals.[6]

Impact on academic and research communities

- NICER research has contributed to the global academic and industry response to the World Health Organisation's declaration identifying myopia as a significant worldwide public health concern.
- The International Myopia Institute uses NICER study data to illustrate global myopia prevalence and includes the research in a series of peer-reviewed White Papers - utilising study outcomes to profile myopia risk factors and present evidence-informed clinical guidance for eye healthcare professionals.[7,8]
- NICER prevalence and progression data were used to justify and inform study design of the first randomised controlled clinical trials to evaluate the efficacy of low dose atropine eye drops to control childhood myopia progression in the UK and Ireland.[9,10]

Influence on policymakers

- NICER data have been cited and utilised by lobbyists, the optical industry, and in healthcare strategy documents relating to children's eye care services. Boots Opticians use NICER data to evidence the need for improved provision in their children's eye health Green Paper.[11]
- In Wales, NICER data were utilised to establish the case for universal vision screening at school entry and to highlight the high prevalence, compared to typically developing children, of vision problems in children with developmental disability. As a consequence, NHS Wales have committed to ensuring all children entering mainstream education undergo in-school vision screening (>34K children/year) and that children in special education receive in-school eye examinations (>4K children).[12,13,14] Work is underway to replicate the benefit across the four nations.

The NICER study is an ambitious, challenging, long-term project. We are grateful to the College for their support over an extended time period, which has allowed us unique insight into the refractive development and eye growth of children living in the UK. These prospective UK data are hugely valuable because myopia is influenced by genetics and environment, hence practitioners need data specific to UK children on which to build appropriate myopia management strategies.

Following the publication of the nine-year eye growth and refractive development data, we are working with the College and other researchers, to produce practice-friendly tools for optometrists to help stratify risk for myopia and formulate follow-up and treatment protocols.

Professor Kathryn Saunders, Principal Investigator

I am extremely grateful to the College for funding my PhD, so giving me the opportunity to be involved in the NICER Study. It was exciting to be part of the first UK-based prospective study of cycloplegic refractive error and ocular component measures and I was privileged to learn many invaluable skills within the process. Outcomes at every stage of the NICER study are pivotal in understanding how we will effectively manage refractive error in the future.

Dr Karen Breslin, former Postgraduate Scholar

Work in progress: current and future research (NICER 2.0)

- The NICER team is currently exploring how environmental and lifestyle factors influence childhood myopia development in more detail.
- A new study is underway to find out whether the prevalence of myopia is increasing further and, if so, what is causing it. As before, local schoolchildren are being recruited to complete the new research study (temporarily on hold due to COVID-19 restrictions).
- The new study will investigate: 1. How many children in Northern Ireland are myopic now and compare this with previous figures from 2006 (before smart phones and tablets became commonly used) and, 2. How much time children spend studying, playing outside and using smart phones and tablets.
- The NICER team are also developing myopia resources for practitioners (Predicting Myopia Onset and Progression [PreMO] tool), enabling them to use the NICER study evidence-base to stratify young patients into those at more or less risk of future myopia and therefore to support clinical decision-making regarding appropriate retest intervals, myopia management options and patient advice.

References

1. For a complete list of NICER publications in peer-reviewed journals, see Appendix 2 – Publications and reports from commissioned, collaborative, and externally-funded College research projects.
2. Including The College's Professional Certificate in Paediatric Eyecare.
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4. *NHS Overview: Short-sightedness* (myopia) nhs.uk
5. *Look after your eyes* website lookafteryoureyes.org
6. Full details of print and broadcast media dissemination of NICER study outcomes can be found on the NICER study website: ulster.ac.uk
7. Investigative Ophthalmology & Visual Science (IOVS), February 2019, Vol.60. IMI - Defining and Classifying Myopia: A Proposed Set of Standards for Clinical and Epidemiologic Studies iovs.arvojournals.org
8. Investigative Ophthalmology & Visual Science (IOVS), February 2019, Vol.60. IMI – Clinical Management Guidelines Report iovs.arvojournals.org
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11. Seeing the future- Boots Opticians Green Paper on children's eye health: boots-uk.com
12. Optometry Wales: Children's Vision Position Paper. The interface between Primary and Secondary Paediatric Ophthalmic Services in Wales. optometrywales.org.uk
13. A clear vision: Eye care for children and young people in special schools in Wales (2012). visionuk.org.uk
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Case Study 3

Project title:	The Prevalence of Visual Impairment in People with Dementia (PrOVIDe) Project
Funded value:	c.£460,000
Funded period:	2012-2016
External funder:	The National Institute for Health Research (NIHR)
Funding stream:	Health Services and Delivery Research (HS&DR) Dementia Themed Call
Project status:	Completed; published in *Health Services and Delivery Research* (July 2016)
Principal investigator:	Mr Michael Bowen, The College of Optometrists
Co-investigators:	Dr Beverley Hancock, Dr James Pickett, Dr M. Haque, Miss Susan Maskell, Mr Michael Clarke, Ms Sarah Buchanan, Professor David Edgar, Professor John-Paul Taylor, Professor Steve Iliffe

Summary of the research

The prevalence of visual impairment (VI) and dementia increases with age and these conditions may coexist, but few UK data existed on VI among people with dementia. The PrOVIDe project was a two-stage, cross-sectional study of people aged 60-89 years with dementia and a qualitative exploration of individual, carer and professional perspectives. The key research questions were: 1) what is the prevalence of (how common are) vision problems in people with dementia in this age group; and 2) how often are these problems undetected or inappropriately managed? In Stage 1, 708 people with dementia had an eye examination. In Stage 2, interviews were conducted with people with dementia and care workers and focus groups were held with family carers, care workers and optometrists.

Why did the College lead this research?

The College developed this project with the Alzheimer's Society, The Thomas Pocklington Trust, and academic partners from the University of Birmingham, City, University of London, Newcastle University, and University College, London. Data collection relied heavily on optometrists, so the research team agreed that The College would be the lead applicant and sponsor for this NIHR-funded project.

Key findings

Stage 1 of the study found a high prevalence of all types of visual impairment in older people with dementia. The prevalence of VI is disproportionately higher in people with dementia living in care homes. Almost 50% of presenting VI is correctable with spectacles, and more with cataract surgery. Areas for future research are the development of an eye-care pathway for people with dementia; assessment of the benefits of early cataract surgery; and research into the feasibility of specialist optometrists for older people.

Stage 2 findings included evidence that carers and care workers underestimated how much may be achieved in an eye examination, and that people with dementia and their carers were unaware of domiciliary sight test availability. The study also identified a need for improved communication between optometrists and carers: optometrists should be informed of a person's dementia; and

tailoring eye examinations to individual needs includes allowing extra time. Optometrists participating in the research wanted training and guidance about dementia.

Correcting VI may improve the quality of life of people with dementia, but should be weighed against the risks and burdens of undergoing examinations and cataract surgery on an individual basis.

Research impact

The PrOVIDe study successfully answered the questions about prevalence of visual impairment in people with dementia and gathered valuable insight on how eye examinations, treatment and care can be improved. Findings have been widely communicated to optometrists, orthoptists and ophthalmologists, as well as to families and people living with dementia, and to national and international eye health care and dementia support organisations, through CPD events, conferences, online publications and social media.

- The study led to the Visual Impairment and Dementia (VIDem) Summit, which produced a set of research priorities for people living with visual impairment and dementia, and clinicians providing services to this group. The event was co-hosted by The College, Alzheimer's Society and Thomas Pocklington Trust.
- PrOVIDe research has informed The College's Guidance for Professional Practice sections relevant to the examination of people with dementia, and The College's response to the NICE topic engagement on the quality standard for dementia (October 2018).
- Clinical and professional resources developed from PrOVIDe research have been published on the Royal College of General Practitioners and Royal College of Nursing websites.
- PrOVIDe produced NIHR and Alzheimer's Society case studies, increasing the exposure of the findings with clinicians, researchers, and people living with dementia and their carers.
- Findings were presented to the 2018 Vision UK Dementia and Vision conference (The Wellcome Trust, London), which included patients, family and professional care partners, clinicians and researchers.
- PrOVIDe research was included in a series of regional, multi-professional CPD events for optometrists, dentists, and pharmacists.
- Research networks developed through PrOVIDe enabled the College research team to collaborate with the Dementia Research Centre, UCL Institute of Neurology to conduct pilot research to investigate the experiences and views of people living with posterior cortical atrophy (PCA), their family carers and healthcare professionals of vision assessment tests (Dementia - Which test is Best? project).
- As part of their involvement in a national research project, the 14 study optometrists received research methods training and were provided with opportunities to gain experience presenting findings at the College's national conference.
- PrOVIDe research optometrists have gone on to pursue external funding opportunities including the College's Small Grants Scheme for practice-based research, and have taken up part-time academic posts.

Work in progress

Led by the College, PrOVIDe researchers are working on two proposals for further external funding directly related to the PrOVIDe findings.

> PrOVIDe has given us valuable evidence about visual impairment among people living with dementia in the UK. This has been shared widely with the profession, and will continue to inform the development of resources for clinicians and people living with dementia. This will support more effective access to and benefit from existing eye health services. PrOVIDe has also pointed to further research, which is currently being developed.

Michael Bowen, Principal Investigator

PrOVIDe in numbers

1.5k

Findings have been presented to over 1,500 delegates and stakeholders at conferences and events

14

14 optometrists participated in this national research project

30

So far, the PrOVIDe final report has been cited >30 times in peer reviewed journals

700

Over 700 eye examinations were conducted with people with dementia across 20 NHS sites in 6 English regions (Stage 1)

10

The team included 10+ researchers (from across disciplines) based at 7 institutions and organisations, spanning academia, charity and commercial partners

10%

The project was delivered >10% under budget, which enabled the College (with NIHR approval) to use of some of the remaining funds for the VIDem Summit

72

Stage 2 included interviews with 47 people with dementia and care workers; 72 optometrists and family and professional carers participated in focus groups

PrOVIDe firsts

The first time the NIHR had funded a professional body like the College as the lead applicant for a health research project.

The first ever UK study to compare the prevalence of visual impairment between people living with dementia living in their own homes, with those living in residential care settings.

The first study to gather detailed eye health and vision data from people living with dementia using optometrists – previous studies had gathered data that are more basic on vision/eye health.

The VIDem Summit was the first time that the research priorities from two James Lind Alliance Priority Setting Partnerships (Dementia PSP and the Sight Loss and Vision PSP) were reviewed to identify priorities relevant to those living with, or providing care to, concurrent conditions from the parent PSPs.

Publications

1. Bowen M, Edgar DF, Hancock B, et al. The Prevalence of Visual Impairment in People with Dementia (the PrOVIDe study): a cross sectional study of 60-89 year old people with dementia and qualitative exploration of individual, carer and professional perspectives. *Health Services and Delivery Research* 2016; 4 (21).
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Case Study 4

Project title:	Communication Skills in Optometry (The Practical Work of the Optometrist 2)
Funded value:	£45,230 from ESRC; £38,610 from The College of Optometrists
Funded period:	2013-2014
Funder:	Co-funded by Economic and Social Research Council (ESRC) and The College of Optometrists
Funding stream:	ESRC Knowledge Exchange Grant; College Commissioned and Collaborative Projects
Project status:	Completed
Principal investigator:	Dr Dirk vom Lehn, King's Business School, King's College London

Summary of the research

This project investigated the social organisation of interaction and communication in eye examinations; the importance of interaction and communication for the assessment of vision and ocular health; and the provision of insights and findings that can help optometrists to communicate more effectively with patients. Previously, the KCL research team collaborated with partners at the Institute of Education, London South Bank University, and City, University of London, on an ESRC funded project that explored communication in optometric consultations by video-recording the interaction between optometrist and patient. As part of the original research, the team videorecorded more than 60 optometric consultations in community and high street practices, and student clinics. They also conducted interviews with optometrists and observed patients in practice reception areas. That project provided a basis for a second project, 'The Practical Work of the Optometrist 2,' completed by means of an ESRC Knowledge Exchange grant co-funded by the College.

The researchers conducted workshops in optometrists' practices, inviting practitioners to reflect on their own communication conduct by watching video-recordings of their interaction with patients.

Why did the College fund this research?

The original research project was the first sociological study of the work of optometrists. The researchers identified and addressed an evidence gap; optometry had not previously been analysed from a social science perspective, unlike other areas of healthcare practice. Their research aimed to provide a body of findings rooted in everyday optometric consultations and to inform communication practice and training.

The purpose of the second project, 'The Practical Work of the Optometrist 2,' was designed to use the findings from the original project to contribute to the communication skills training and CPD of optometrists.

Key findings

- The research revealed that interaction and communication play a critical role in the delivery of optometric healthcare service:
    - the choice of words in the opening of consultations is very important; for example, to avoid the word 'problem' when trying to elicit and identify any difficulties that patients are experiencing;
    - despite following the guidelines of textbooks and professional organisations, the design of practices varies across patients and consultations and is dependent on concrete interaction between optometrist and patient; and
    - fairly small changes in optometrists' communication conduct with patients can improve their experience and clinical outcomes.
- The project also demonstrated the methodological relevance of video-based analyses to in-depth, inductive qualitative analysis that scrutinises the interactional role of talk and bodily action.

Research impact

- The research made a distinctive conceptual and theoretical contribution to social science research and studies of interaction and communication in health care settings.
- In collaboration with the College, the researchers designed a communications skills portfolio for optometrists, available on the College website.
- The portfolio provided the basis for an online CET course, available as part of the College's CPD programme.
- The findings were disseminated as CET bearing articles in Optician and Optometry Today.

> The funding by The College of Optometrists has allowed us to turn our findings from a sociological research project into material that helps optometrists to become more effective in their communication with patients.

Dr Dirk vom Lehn, Principal Investigator

ESEP in numbers

1

1 Communication Skills Portfolio (available on College website)

3

3 CET publications in professional magazines

9

9 publications in academic journals (Part 1 and Part 2)

7

7 academic researchers (3 sociologists, 3 optometrists, and 1 research assistant) working across 5 universities

Over 500 optometrists completed the College's CET bearing online course, 'Eye examinations – improve your skills,' as of October 2020

500

Publications

1. vom Lehn D, Dirk, Helena Webb, Christian Heath, and Will Gibson. 2013. 'Assessing Distance Vision as Interactional Achievement: A Study of Commensuration in Action'. *Soziale Welt* 64, no. 1–2: 115–136.
2. Webb, Helena and Dirk vom Lehn. 'Eye Contact and Gaze in Optometry Consultations'. *Optometry Today* 51 (2011): 16–18.
3. Webb, Helena, Dirk vom Lehn, Bruce JW Evans, and Peter Allen. 'Communication: Part 1 – Soliciting Information from the Patient'. *Optometry Today* 54 (2014): 52–54.
4. Webb, Helena, Dirk vom Lehn, Bruce JW Evans, and Peter Allen 'Communication: Part 2 – Delivering Findings and Advice to the Patient'. *Optometry Today* 54 (2014): 48–51.

Case Study 5

Case Study – Dr Julie-Anne Little, Research Fellow (2011-2013)	
Name:	**Julie-Anne Little, PhD, BSc(Hons), MCOptom, PgCERT, FHEA** Associate Research Director - School of Biomedical Sciences, Ulster University. Research Excellence Award winner, Neil Charman Medal for Research (2016)
Research fellowship:	Investigation of accommodative function in two special populations, Autism spectrum disorder (ASD) and Down syndrome (DS)

Summary of the research

The Research Fellowship enabled me to have a research sabbatical in the USA and to establish a laboratory-based technique to dynamically measure accommodation and vergence binocularly. This technique has since been used to investigate accommodative function in typically developing children and adults, children with Autism spectrum disorder (ASD) and Down syndrome (DS). More recently, we have adapted this technique to investigate accommodative status in uncorrected hyperopia and have just published our findings that some children with hyperopia show an improvement in accommodative response during a prolonged reading task when their hyperopia was corrected. This work highlights the importance of a comprehensive eye examination for children.

Impact of the fellowship:

The fellowship gave me the time and resources to evaluate the literature, synthesise my knowledge, and gain a deep understanding of accommodative function and the measurement capabilities of the photorefraction technique.

During the fellowship, I established longstanding collaborations with Professor Rowan Candy (School of Optometry, Indiana University, USA) and Dr Shrikant Bharadwaj (LV Prasad Optometry Institute, Hyderabad, India).

Through these collaborations, I developed a deep understanding of photorefraction and its limitations and worked with a customised infrared photorefraction system. I developed programming skills to work with the data generated from the system, and identified new areas of research to explore and understand the potential effects of pupil size and the importance of individual calibration of vergence information as well as refractive power.

The Power Refractor system has led to a number of exciting developments to explore accommodative function in relation to other aspects of visual function. I developed and conducted research to explore the ability and capacity for sustained accommodation in hyperopia, and this work has contributed to knowledge regarding when and what level of hyperopia should we prescribe a refractive correction to. Collaborating with research partners around the world, I also developed research to explore the natural history of anisometropia.

My fellowship research in visual function in children with ASD and DS has informed and contributed to educational and clinical materials for health professionals and stakeholders. This includes information for parents about eye care and attending for an eye examination for a child with ASD published on the National Autism Society website and information for parents of children with complex needs on the Ulster University website.

The professional relationships established during the fellowship have led to further collaborative research in two areas: comparing the clinical technique of dynamic retinoscopy to the PowerRefractor III to measure accommodative function, and researching the importance of prism calibration for accuracy of vergence measurements with photorefraction.

Since completing the fellowship seven years ago, I became Senior Lecturer and Optometry and Lead for the Centre of Vision Science Research at Ulster University. My research interests continue to include the developing visual system and the impact of intellectual disability, particularly Down syndrome, and other neurodevelopmental disorders including autism, on vision. I am interested in how the structure of the eye impacts on functional vision, and currently lead a project investigating the use of Ocular Coherence Tomography to image the crystalline lens and better quantify cataract.

I have supervised PhD and MSc students and secured significant research grant funding. In 2016, I was awarded the College's Neil Charman Medal for my research in the area of children with special educational needs and complex visual problems.

Publications

1. Bharadwaj SR, Sravani NG, Little J-A, Narasaiah A, Wong V, Woodburn R, Candy. Empirical variability in the calibration of slope-based eccentric photorefraction. *J Opt Soc Am A* 2013; 30: 923-931.
2. Anketell PM, Saunders KJ, Gallagher SJ, Bailey C and Little J-A. Clinical measure of vision in children with Autism Spectrum Disorder; what should clinicians expect? *J Autism Dev Disord* 2015; 45: 3041-3047.
3. Doyle L, Saunders KJ and Little J-A. Trying to see, failing to focus: near visual impairment in Down syndrome. *Sci Rep* 6, 20444 (2016).
4. Doyle L, Saunders KJ and Little J-A. Determining the relative contribution of retinal disparity and blur cues to ocular accommodation in Down syndrome. *Sci Rep* 7, 39860 (2017).
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9. Michael Ntodie, Kathryn J. Saunders, Julie-Anne Little; Correction of Low-Moderate Hyperopia Improves Accommodative Function for Some Hyperopic Children During Sustained Near Work. Invest. *Ophthalmol. Vis. Sci.* 2021;62(4):6. doi: https://doi.org/10.1167/iovs.62.4.6

Case Study 6

Case Study – Dr Pádraig Mulholland, Clinical Research Fellow (2014-2019)	
Name:	**Pádraig Mulholland, BSc MCOptom PhD Prof Cert Glauc FHEA** Joint Principal Optometrist (Research), Moorfields Eye Hospital NHS Foundation Trust; Lecturer in Optometry, School of Biomedical Sciences, Ulster University; Honorary Lecturer, Visual Neuroscience, UCL Institute of Ophthalmology; Honorary Research Fellow, School of Optometry and Vision Sciences, Cardiff University. The George Giles Postgraduate Research Prize (2014)
Clinical research fellowship:	Improving the structure/function relationship in glaucoma using 3D perimetric stimuli

Summary of the research

This fellowship project developed improved methods for the measurement of visual fields (perimetry) in glaucoma. Perimetry is central to the detection and monitoring of glaucoma related vision changes in all areas of optometric practice, and requires patients to detect light spots of fixed area and duration but variable brightness. While widely used, the test suffers from important limitations, including a poor sensitivity to the effects of early glaucoma, the inability to perform the test effectively in advanced disease, and a poor relationship of vision measures to the number of retinal ganglion cells lost as part of the disease. In this work, we determined that such issues may be addressed by a new perimetry test where the size, presentation duration and brightness of spots presented were changed to probe altered spatial and temporal visual function (summation) in glaucoma.

Impact of the fellowship

The Clinical Research Fellowship provided me with the resources, time and support to transition from a post-doctoral researcher to an effective independent clinician-scientist, building my own lab within a higher education setting and the NHS.

I advanced my research skills in a number of areas, including data handling and statistical analysis, programming, experimental setup and equipment calibration. As a primary investigator, I also had the opportunity to lead all aspects of research within NHS care settings – including managing a research budget and a clinical research space, purchasing equipment, and promoting patient and public involvement in research. Crucially, the research fellowship also provided me with the time and resources to establish and nurture research collaborations both within the UK and internationally.

During the fellowship, I published research in high-impact journals, presented work at a number of international research meetings, promoted the research among charities and industrial partners, and secured competitive research funding from Moorfields Eye Charity, Fight for Sight, and the Macular Society. My fellowship work was also recognised with a number of awards including the Northern Ireland Translational Research Group for Vision Conference Poster Prize (2015), the Association for Research in Vision and Ophthalmology (ARVO) International Travel Grant (2016), and the Imaging and Perimetric Society Heidelberg Engineering Young Investigator Award (2016).

The fellowship support and related research successes greatly contributed to my appointments to professional and honorary research positions within universities, the NHS and National Institute of Health Research (NIHR). In these roles, I strive to support the optometric clinician-scientists of the future, while further developing my own research. I also advocate to enhance the visibility and impact of optometric research within the UK through my work as an optometry representative on the NIHR Clinical Research Network National Ophthalmology Speciality Committee.

Currently, the outcomes from my clinical research fellowship are being further developed as part of a collaboration between Moorfields, UCL, Ulster University and Cardiff University. We aim to develop a clinical perimetry test that is more patient friendly, inexpensive and more effective at detecting the effects of ocular disease including glaucoma. I am also working towards expanding my lab through securing competitive research grant income, recruiting ambitious PhD and postdoctoral researchers, continued dissemination of research findings and developing strong links with patient groups, industry, research charities, and healthcare providers.

Publications

1. Rountree L, Mulholland PJ, Anderson RS, Garway-Heath DF, Morgan JE, Redmond T. (2018) Optimising the glaucoma signal/noise ratio by mapping changes in spatial summation with area-modulated perimetric stimuli. *Sci. Rep.*, 8(1): 2172.
2. Matlach J, Mulholland PJ, Redmond T, Cilkova M, Chopra R, Dakin SC, Garway-Heath DF, Anderson RS. Relationship between psychophysical measures of retinal ganglion cell density and in vivo measures of cone density in glaucoma. *Ophthalmology*. 124(3):310-19.
3. Mulholland PJ, Redmond T, Garway-Heath DF, Zlatkova MB, Anderson RS. The effect of age on the temporal summation of achromatic perimetric stimuli. *Invest Ophthalmol Vis Sci* 2015;56:6467-6472.
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7. Rountree L, Mulholland PJ, Anderson RS, Garway-Heath DF, Morgan JE, Redmond T. Optimising the glaucoma signal/noise ratio by mapping changes in spatial summation with area-modulated perimetric stimuli. *Sci Rep* 2018;8:2172.

Case Study 7

Case Study – Dr Shelley Black, Small Grants Scheme (2015-2016)	
Grantee:	**Shelley Black BSc PhD MCOptom Prof Cert Glauc** Research Optometrist, Northern Ireland Clinical Research Network (NICRN), Royal Victoria Hospital, Belfast Philip Cole Prize for Practice-Based Research (2020) Undergraduate Research Scholarship, College of Optometrists (2007)
Project title:	Changing a habit: An audit on the impact of training for Local Enhanced Services (LES) in Northern Ireland on the community optometrist's routine practice when assessing for the signs of glaucoma
Funded value:	ca.£10,000
Funded period:	2015 - 2016
Funding stream:	Small Grants Scheme
Project status:	Completed

What was your SGS research about?

At the time, various studies had assessed the ability of optometrists to detect glaucomatous disc changes, but none had looked at the impact of training in the detection of glaucomatous signs during routine clinical eye examinations. I was interested to investigate what measurements and techniques the 'typical' primary care optometrist would carry out for patients considered to be 'at risk of glaucoma' and whether or not the Local Enhanced Services (LES) training in Northern Ireland and/or the Professional Certificate in Glaucoma had an effect on practitioners assessment of the signs of glaucoma.

What was the clinical significance of the study findings?

The findings of the audit illustrated the positive impact of additional training on optometrists' clinical practise, both on routine assessment and in their approach to assessing for signs of glaucoma. It also provided evidence that some optometrists were still not confident in performing contact tonometry and could benefit from practical workshops.

Did your SGS funding lead to any research outputs or publications?

Yes, I had an article published in Optometry in Practice (Black S, McClelland J and Richardson P, 2017: 'An audit on the impact of training for a Referral Refinement Scheme in Northern Ireland on community optometrists' clinical practice when assessing for signs of glaucoma,') and I presented my work in poster presentations at the British Congress of Optometry and Vision Science (BCOVS) conference and the Vision Translational Research Group (TRG) conference.

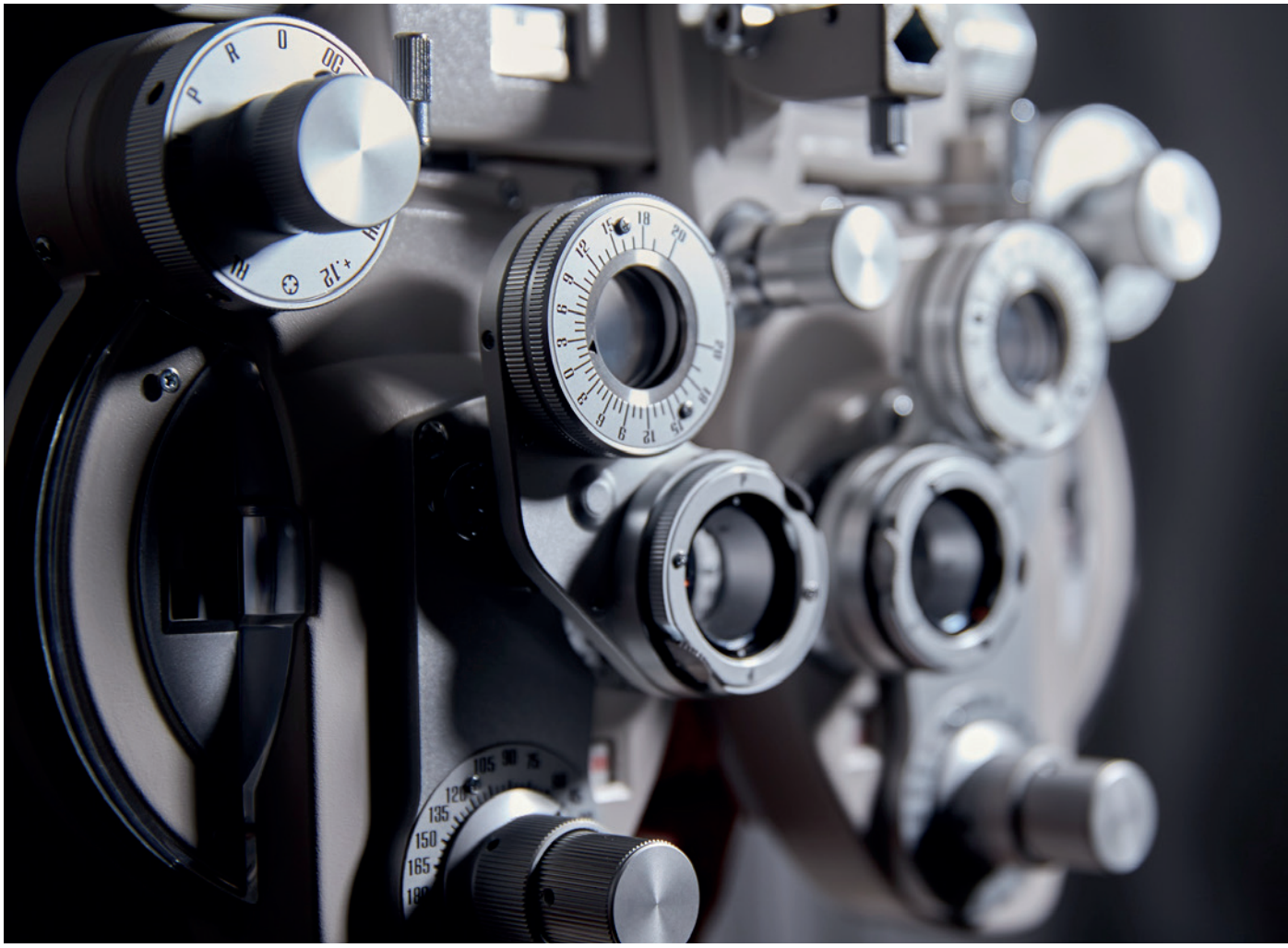
How did your SGS study help to develop your research skills, clinical skills and/or career?

I applied for the College of Optometrists SGS after working in primary care for 5 years. My SGS study gave me the opportunity to develop a set of skills outside my routine clinical practice. I learnt how to complete grant and ethics applications, analyse data and present my findings to a research audience. My experience in completing a SGS study gave me the confidence to apply to Ulster University to work on the Special Education Eyecare (SEE) project and was instrumental in me being successfully awarded a PhD scholarship. My work on the SEE project has led to me recently winning the Philip Cole Prize for practice-based research along with my colleague Emma McConnell.

What are your current research and/or clinical practice interests?

I am a Research Optometrist in Northern Ireland's Clinical Research Network (NICRN) at the Royal Victoria Hospital in Belfast. As part of the NICRN's multidisciplinary team I have the opportunity to work on clinical trials which involve the experimental use of novel therapeutics for ocular conditions such as wet AMD and diabetic retinopathy.

I also work in primary care and have a special interest in adults and children with learning disability.



Case Study 8

Case Study – Dr Ross Henderson, Small Grants Scheme (2010-2011)	
Grantee:	**Ross Henderson PhD MCOptom DipTp(IP) DipGlauc** NHS Optometric Adviser, NHS Tayside (2012-2021) Philip Cole Prize for Practice-Based Research (2014)
Project title:	A Preliminary Service Evaluation of Scottish and English General Ophthalmic Services (2011)
Funded value:	ca. £13,500
Funded period:	2010 - 2011
Funding stream:	Small Grants Scheme (formerly iPRO, the Innovation in Practice Based Research for Optometrists grant scheme)
Project status:	Completed

What was your SGS research about?

Due to the lack of data available at the time to assess the impact of the systematic differences between general ophthalmic services (GOS) in Scotland and England (since the statutory changes within the NHS in Scotland in 2006), this preliminary evaluation in 2010 focused on the conditions detected and managed in particular patient groups by optometrists following different GOS procedures.

The main objective was to evaluate the difference in the number of patients with eye conditions (or clinical findings that indicate higher risk of eye disease), investigated and managed across Scotland and England and to examine the impact, if any, of different GOS regulations and funding on patient care. A cross-sectional survey of 50 community optometrists across Scotland and England was conducted and a retrospective analysis of anonymised data from GOS patient records (n = 1925) was performed.

What was the clinical significance of the study findings?

To my knowledge, this was the first study that compared NHS eye examination data in Scotland and England following the change in the Scottish GOS contract in 2006. Additionally, this study was envisaged as a preliminary 'scope' of optometric practice.

The main finding was that the lack of any significant differences in the number of patients with a range of eye conditions found during routine optometric examinations suggested that both arrangements were equally effective in condition detection. The effectiveness of the English system was, however, in some cases, at additional expense to either the patient or the primary care trust. In Scotland, patients were more likely to be given advice on any condition found, as it was a contractual requirement, and if referral was required, they were more likely to be referred directly to the hospital eye service. Both

these outcomes suggested that the Scottish GOS arrangement may allow for a higher standard of patient care, although more research on determining the appropriateness of the clinical decisions and management by the optometrists working under the Scottish contract was necessary to substantiate this.

Following this preliminary evaluation, future evaluations started to detect changes in the patients attending optometrists by looking at specific regions rather than attempting to compare Scotland and England.

Did your SGS funding lead to any research outputs or publications?

The findings of this study were published as, 'A comparison of Scottish and English General Ophthalmic Services: a preliminary evaluation of the impact on patient care,' in Optometry in Practice (2012).

How did your SGS study help to develop your research skills, clinical skills and/or career?

The study spurred me on to becoming the Optometric Adviser for NHS Tayside in 2012, at a time of great change for community optometry. Since then, electronic referral, Independent Prescribing, and improved working with the Hospital Eye Service have been achieved. Glaucoma patients are also now being reviewed in the community due to COVID-19 restrictions in secondary care.

What are your current research and/or clinical practice interests?

I am an independent prescribing optometrist working in community practice. During COVID-19 phase 1, my practice was an Emergency Eye Care Treatment Centre which was a real test of my prescribing abilities. I have a longstanding teaching involvement at Glasgow Caledonian University on the Independent Prescribing course. I lecture on dry-eye management and local and national policies impacting on prescribing.

I am currently undertaking a treatment audit of dry-eye prescribing which I hope to write up for publication. I am also interested in glaucoma and plan to become involved in community glaucoma management now that NHS Tayside will be participating in the NHS Education for Scotland Glaucoma Award Training (NESGAT).

SECTION 4

THE FUTURE OF COLLEGE RESEARCH

4.1 Strategic aims for research 2020-2025

Research is at the heart of our vision of optometrists at the forefront of better eye health and vision for all. As part of its new strategic plan, the College will support members through what will likely be a period of change within the profession, due in part to the ongoing GOC Educational Strategic Review, NHS work in progress to move provision and service delivery from secondary care to primary care, and the challenges brought by COVID-19.

The new research strategy 2020-25 sets out how research will support the profession in meeting the challenges that will arise in four ways:

1. **Delivering evidence:** leading research and reviewing evidence to ensure members have access to the data, information and knowledge they need for daily practice. We will work with members, partners, and the public to identify gaps in the evidence-base for optometry in primary and secondary care, and develop research to help fill these gaps. Priorities in this area include improving evidence related to:

    - the developing scope of practice for optometrists
    - new models of eye care and optometry
    - optometric workforce data to inform workforce planning and service delivery
    - advanced optometric practice and CPD
    - the next stages of the Educational Strategic Review.

2. **Increasing impact:** working with research partners, funders, and key sector stakeholders to ensure research conducted by optometrists is available to clinicians, academics, researchers and the public. We will use the College's communication channels to reach multiple audiences, in the most appropriate formats, in order to achieve the greatest impact. Our priority areas for increasing impact are:

    - highlighting and celebrating world class research by optometrists through our Research Excellence Awards
    - increasing awareness of, and access to, research on the impact of optometric research on eye health
    - sustaining and promoting OPO's position as the leading optometry journal in the world
    - promoting optometric research by sharing findings with the public.

3. **Translating research for practice:** working with our policy team and clinical advisers, we will review the latest optometry, vision science, and related research to ensure the implications for clinical practice are shared with the profession, policymakers, and the public. This will inform our professional guidance and advice to the public. Our priorities for translating research are:

    - creating and curating content for blogs, podcasts, videos and evidence in practice briefings
    - highlighting new research published in OPO in plain English summaries for non-research active audiences
    - developing Optometry in Practice as an online learning resource.

4. **Building research capacity:** the research team will drive the part of the College's strategy to lead research projects and be an effective partner in research collaboration in order to increase funding for optometry research and researchers. We will achieve this by:

    - funding research scholarships and fellowships to help postgraduate and undergraduate students develop research skills and careers
    - providing members with advice, guidance, and research skills training via the practice-based Small Grants Scheme
    - involving members in research opportunities
    - developing applications for external funding with research partners.

4.2 Current research in progress

Going forward, we will provide regular updates on active College-funded and collaborative research projects currently underway, and will report on our progress delivering the four strategic aims for research.

In the short term we will identify research opportunities that provide the evidence to support new and extended optometric practice and optometry-led models of care; evaluate the potential impact on patient outcomes of different models, funding and enablers of enhanced, optometry-led eye care services across the UK; and collate evidence on the role of existing and emerging technologies, particularly in post-pandemic urgent and extended models of primary eye care.

In the near future, we will:

- Publish findings from The Impact of Vision On Road Traffic Accidents That Result In Injury project, funded by the Department for Transport Road Safety Research Grant Scheme.
- Continue to provide leadership and support for the bid to secure funding for the UKNEHS (UK National Eye Health and Hearing Study). The UKNEHS will identify the prevalence and causes of vision impairment and blindness in the UK population aged 50 and over, providing an up-to-date and comprehensive picture of the UK's eye health, across all four nations.
- Fund a new postdoctoral researcher to investigate swollen optic nerves and referral thresholds.
- Publish a special issue of OPO, 'Seeing beyond 2020,' published in May 2021.
- Continue to support the six current College Postgraduate Scholars as they complete their PhD research.
- Support the current three College Research Fellows, and their research in progress on myopia control lenses, tools for monitoring glaucoma, and face perception.
- Fund three new postgraduate scholars who will take up positions from 2021 (grants awarded in 2019 and 2020).
- Welcome a new Clinical Research Fellow, starting research on retinal disease and neuroscience in April 2021.
- Provide research and statistics advice and guidance to the four Small Grants Scheme grant holders currently undertaking practice-based research.
- Support further publications and outputs from the ESEP, NICER and PrOVIDe projects.

4.3 Work with us

How to be involved with College research, and help the College deliver evidence, increase impact, translate research for practice, and build research capacity:

- Contact the research team with ideas and proposals for new research project proposals and collaborations.
- Suggest current research opportunities, including open surveys, research studentships, and funding calls to be listed on our research website pages.
- Attend College CPD and CET events and participate in online learning to find out about the latest research findings.
- Apply for a Small Grants Scheme Award to undertake practice-based research.
- Nominate a researcher for one of the College's Research Excellence Awards.
- Read the latest original research, reviews, and editorials in OPO and OiP.
- Become a peer reviewer or author: optometry and vision science researchers are encouraged to submit original papers to OPO or nominate themselves as a peer review in their area(s) of expertise.
- Listen to the College of Optometrists podcast: the College's Head of Research, Clinical Adviser and special guests regularly discuss the latest in eye health, research developments, patient experiences, and taking care of yourself and your career as an optometrist.

For full information on the College's research funding awards, including Terms and Conditions, eligibility requirements, and to how to apply, please see the College website. There will be changes to the usual funding awards in 2021 due to COVID-19: please contact a member of the research team for full details. researchteam@college-optometrists.org

APPENDICES

Appendix 1: College commissioned, collaborative and externally-funded research projects since 2008

Year funded/ began	Type and amount of funding	Project title and team	Research and outputs
2009	Commissioned and collaborative project c.£35,000	The UK Eye Care Services Study Warwick Medical School, University of Warwick Principal Investigator: Dr Carol Hawley	Phase One: Systematic Review of the Organisation of UK Eye Care Services Phase Two: Organisation of Eye Care Services in the West Midlands Two reports published by the College
2010	Commissioned and collaborative project c.£30,000	Optometric Workforce Survey 2010 College Research Team and Dr Naya Khachatryan, Independent Researcher	Two-phase study (literature review and questionnaire-based cross-sectional survey) investigating UK optometrists, their patterns of practice, training and experience, career trajectory and future intentions. Results presented at three international research conferences, 2011-2012.
2011	Commissioned and collaborative project c.£11,000	An Evaluation of the Quality of Ready-Made Spectacles University of Bradford Principal Investigator: Professor David Elliott	Research to determine whether the optical quality of near-vision ready-made spectacles reaches the quality assurance levels required by the international standard. Findings published in *Optometry & Vision Science*, 2012
2012	Commissioned and collaborative project £107,205	Northern Ireland Childhood Errors of Refraction Project – Phase 3 (NICER 3) Ulster University Principal Investigator: Professor Kathryn Saunders	The largest study in the UK and Ireland to examine how children's vision, in particular their refractive error, changes through childhood and adolescence. The longitudinal research study began in 2006. Eight publications in peer-reviewed journals to date (from NICER 3 & 4).
2012	Commissioned and collaborative project c.£360,000	Enhanced Scheme Evaluation Project (ESEP) City, University of London Principal Investigator: Professor John Lawrenson and Manchester Royal Eye Hospital Principal Investigator: Dr Robert Harper	College-funded research to evaluate community-based eye care service models in order to better understand the impact of the organisation of services on clinical effectiveness; cost effectiveness; and patient safety. Eight peer reviewed papers (to date)

2012	Externally-funded Funded by the National Institute for Health Research Health Services and Delivery Research Programme (project number 11/2000/13) £460,000	Prevalence of Visual Impairment in People with Dementia (PrOVIDe) study The College of Optometrists Principal Investigator and corresponding author: Michael Bowen, Director of Research Co-authors from: City, University of London; University of Birmingham; The Outside Clinic; Thomas Pocklington Trust; University College London; Alzheimer's Society; Newcastle University; Northumberland, Tyne and Wear NHS Foundation Trust; Trinity College Dublin	The primary objective of this research, a cross-sectional study of people aged 60-89 years with dementia and a qualitative exploration of individual, carer and professional perspectives, was to measure the prevalence of eye conditions causing VI in people with dementia and to identify/ describe reasons for underdetection or inappropriate management. Findings published in NIHR Health Services and Delivery Research (HS&DR), July 2016
2012	Commissioned and collaborative project £89,006	Aston Eye Study 2 Aston University Principal Investigator: Dr Nicola Logan	Launched in October 2005, the Aston Eye Study Phase 1 (AES1) was a cross-sectional study to determine the prevalence of refractive error and its associated ocular biometry, using a large, multi-racial sample of children from Birmingham (UK). Phase 2 (AES 2) reviews children who were aged 6-7 in AES1 to find how many children have become short-sighted since they were first seen and why this might have occurred. AES2 findings presented at the ARVO Annual Meeting 2018.
2012	Commissioned and collaborative project £50,000	Sight Loss and Vision Priority Setting Partnership (SLVPSP) College of Optometrists in partnership with the James Lind Alliance, Fight for Sight, NIHR Moorfields BRC, Royal College of Ophthalmologists, RNIB, UK Vision Strategy	The SLVPSP identified (for the first time) the most pressing unanswered questions about the prevention, diagnosis and treatment of sight loss and eye conditions. The aim was to ensure that future research be prioritised according to the needs of patients, carers and eye health professionals. Final Report published Oct 2013. Methodology and results published in BMJ Open (2013).
2013	Commissioned and collaborative project c.£80,000	Ophthalmic Public Health Researcher (PHR) project University of Leeds Principal Investigator: Professor Darren Shickle Ophthalmic Public Health Researchers: Dr Chris Davey and Dr Sarah Slade	The College commissioned the (PHR) project and appointed two part time researchers at the University of Leeds to gather evidence from practice management software to define a minimum primary care eye health record. Six publications in international, peer-reviewed journals.

2013	Commissioned and collaborative project with external funding College funding: £38,610 ESRC funding: £45,230	The Practical Work of the Optometrist 2: Communication Skills in Optometry King's College London Principal Investigator: Dr Dirk Vom Lehn Research team: Dr Helena Webb (Research Assistant) Co-Investigators: Professor Christian Heath (KCL), Dr Will Gibson (Institute of Education, University of London), Professor Bruce Evans (London South Bank University), Professor David Thomson (City, University of London), Professor Peter Allen (Anglia Ruskin University, Cambridge)	A Knowledge Exchange project that used the findings of the ESRC-funded study, 'Assessing Eye Sight and Ocular Health: The Practical Work of Optometrists,' to investigate how optometrists conduct eye examination and how they communicate examination findings to patients. Journal publication and CPD/learning materials produced.
2013	Commissioned and collaborative projects Co-funded by Johnson & Johnson Vision Care £20,000 total (£10k from each)	A Survey of UK Contact Lens Practice for Children and Young People The College of Optometrists Research Team and Dr Beverley Hancock, Independent Researcher	A survey of College members to gain information about practitioner attitudes and behaviours relating to contact lens prescribing for children and young people. Report published 2014
2014	Commissioned and collaborative project £64,605	Online Spectacles Evaluation Project University of Bradford Principal Investigator: Professor David Elliott	An investigation into whether spectacles provided by online retailers meet required standards, and how they compare to spectacles purchased through high street outlets. Findings published in *Optometry & Vision Science*, 2016
2014	Commissioned and collaborative project £26,100	Secondary Care Minimum Data Sets The College of Optometrists Research Team, led by Advisory Group and Working Groups	Datasets to be published by Royal College of Ophthalmologists as part of their portfolio of Clinical Data Sets (estimated early 2021).
2014	Commissioned and Collaborative Project £5,000	Visual Impairment and Road Safety: Analysis of UK Road Casualties and Contributory Factors Warwick Medical School, University of Warwick Co-Investigator: Dr Carol Hawley Co-Investigator: Claire Roberts Optometry Advisor, West Midlands Co-Investigator: Tanya Fosdick Road Safety Analysis	Research to provide evidence for the need for regular eyesight testing to improve road safety. Using the MAST data analysis tool to investigate the relationship between visual impairment and road collisions using STATS19 casualty and contributory factor data. Findings presented to Association for Research in Vision and Ophthalmology Annual Meeting, 2016 and to the 2015 National Road Safety Conference. Final report published by College, June 2015

2015	Commissioned and collaborative projects £5,000 plus in-kind support from UCL	Dementia – Which Test is Best? The College of Optometrists Research Team and Dementia Research Centre, UCL Institute of Neurology	Pilot research by UCL researchers to investigate the experiences and views of people living with posterior cortical atrophy (PCA), their family carers and healthcare professionals of vision assessment tests. Findings published in BMJ Open, March 2019.
2015	Commissioned and collaborative project £149,935	Northern Ireland Childhood Errors of Refraction Project – Phase 4 (NICER 4) Ulster University Principal Investigator: Professor Kathryn Saunders	Project extending NICER data collection to nine years, making it the longest prospective population-based study of refractive error (using cycloplegia) in childhood and early adulthood. Includes examination of cross-cohort differences and similarities in refractive profile. Eight publications in peer-reviewed journals to date (NICER 3 & 4).
2015	Commissioned and collaborative project c.£30,000	Optical Workforce Survey 2015 The College of Optometrists in collaboration with Association of British Dispensing Opticians, Association of Optometrists, Federation of Ophthalmic and Dispensing Opticians, General Optical Council, Local Optical Committee Support Unit, Optometry Northern Ireland, Optometry Schools Council, Optometry Scotland, and Optometry Wales. Research conducted by Dr Beverley Hancock, Independent Researcher.	Quantitative and qualitative data analysis to examine how the optometric workforce (optometrists and dispensing opticians) has changed since 2010, and to identify factors influencing the work of the professions in the next five years, including workforce capacity and its adequacy to meet demand. OWS Report published by the College (February 2016) and presented at the American Academy of Optometry (2015).
2015	Commissioned and collaborative project £10,000 Principally funded by The Central Optical Fund	The Foresight Project Commissioned by The Optical Confederation and The College of Optometrists	A discussion of the potential impact of technology on the UK optical sector to 2030 Report published by 2020health, March 2016
2016	Commissioned and collaborative project £10,000	Collaboration with Cochrane Eyes and Vision (CEV) – updates of two CEV systematic reviews The College of Optometrists Research Team, individual review teams and Dr Jennifer Evans, CEV Editor	Two review updates published in the Cochrane Database of Systematic Reviews: 1. Vision screening for correctable visual acuity deficits in school-age children and adolescents (Feb 2018) 2. Reading aids for adults with low vision (April 2018)

2016	Commissioned and collaborative project College funding: £103,610 Innovate UK funding: £149,538	A Novel Biomechanical and Computational Approach to Elucidate Presbyopia Development Aston University Principal Investigator: Professor Leon Davies Dr Fiona Cruikshank, College-funded Postdoctoral Research Assistant (Jan 2017-Jan 2019)	Project to develop a laboratory model for simulating the human ocular environment and physical focusing action of the human eye and allow the iterative development and testing in an ex vivo setting of a new 'accommodating' intraocular lens, in order to better understand presbyopia. The project is being completed with an Innovate UK Knowledge Transfer Partnership grant (in partnership with Rayner Intraocular Lenses Limited), May 2019-Sept 2021.
2018	Commissioned and collaborative project Co-funded by the Association of Optometrists c.£30,000	Optical Workforce Survey 2015: Further analysis of gender pay differences King's College London Principal Investigator: Dr Catey Bunce,	Follow up research into the OWS 2015 finding of a possible difference between reported salary levels for male and female optometrists. Report published by College, 2018
2020	External Funding From Department for Transport Road Safety Research Grant Scheme £54,000	Research on the impact of vision on road traffic accidents that result in injury The College of Optometrists and Warwick Medical School, University of Warwick	Research in progress, due to report in 2021

Appendix 2: Publications from commissioned and collaborative and externally-funded College research projects since 2008

1. 2020Health. Foresight Project Report: A discussion of the potential impact of technology on the UK optical sector to 2030. Commissioned by The Optical Confederation & The College of Optometrists. March 2016. Available from: college-optometrists.org
2. Alderson AJ, Green A, Whitaker D, Scally AJ, Elliott DB. A comparison of spectacles purchased online and in UK optometry practice. Optometry and Vision Science 2016; 93: 1196-1202.
3. Baker H, Harper RA, Edgar DF, et al. Multi-stakeholder perspectives of locally commissioned enhanced optometric services. BMJ Open 2016; 6: e011934.
4. Baker H, Ratnarajan G, Harper RA, Edgar DF, Lawrenson JG. Effectiveness of UK optometric enhanced eye care services: a realist review of the literature. Ophthalmic & Physiological Optics 2016; 36: 545–557.
5. Bowen M, Edgar DF, Hancock B, et al. The Prevalence of Visual Impairment in People with Dementia (the PrOVIDe study): a cross sectional study of 60-89 year old people with dementia and qualitative exploration of individual, carer and professional perspectives. Health Services and Delivery Research 2016; 4 (21).
6. Bowen M, Zutshi H, Cordiner M, Crutch S, Shakespeare T. Qualitative, exploratory pilot study to investigate how people living with posterior cortical atrophy, their carers and clinicians experience tests used to assess vision. BMJ Open. 2019; 9:e020905.
7. College of Optometrists. A survey of UK contact lens practice for children and young people – Full report. 2014. Available from: college-optometrists.org
8. College of Optometrists. Ophthalmic Public Health Research Project: Final Report. December 2017. Available from: college-optometrists.org
9. College of Optometrists. Optometric Workforce Survey 2010. Internal report. 2011. Unpublished.
10. College of Optometrists. The optical professions: what does the future hold? Report of roundtable 29 September 2016. Published November 2016. Available from: college-optometrists.org
11. College of Optometrists in partnership with the Association of British Dispensing Opticians, Association of Optometrists, Federation of Ophthalmic and Dispensing Opticians, General Optical Council, Local Optical Committee Support Unit, Optometry Northern Ireland, Optometry Schools Council, Optometry Scotland, and Optometry Wales. The Optical Workforce Survey. February 2016. Available from: college-optometrists.org
12. College of Optometrists. Optical sector workforce survey 2015: Report on further analysis of gender pay differences. 2018. Available from: college-optometrists.org
13. College of Optometrists in partnership with Alzheimer's Society, James Lind Alliance, and Thomas Pocklington Trust. Report of the Visual Impairment and Dementia (VIDem) Summit. March 2016. Available from: college-optometrists.org
14. Dabasia PL, Edgar DF, Garway-Heath DF, Lawrenson JL. A survey of current and anticipated use of standard and specialist equipment by UK optometrists. Ophthalmic & Physiological Optics. 2014; 34: 592-613.
15. Davey CJ, Slade SV, Shickle D. Eyecare for ethnic minority groups in the UK. Optometry in Practice 2014; 15: 133-136.
16. Davey C, Slade S, Shickle D. A proposed minimum data set for international primary care optometry: a modified Delphi study. Ophthalmic & Physiological Optics. 2017; 37: 428-429.
17. Doherty SE, Doyle LA, McCullough SJ, Saunders KJ. Comparison of retinoscopy results with and without 1% cyclopentolate in school-aged children. Ophthalmic & Physiological Optics 2019; 39: 272-281.
18. Doyle LA, McCullough SJ, Saunders KJ. Cycloplegia and spectacle prescribing in children: attitudes of UK optometrists. Ophthalmic & Physiological Optics 2019; 39: 148-161.
19. Elliott DB, Green A. Many ready-made reading spectacles fail the required standards. Optometry and Vision Science. 2012; 89: E446-E451.
20. Evans JR, Morjaria P, Powell C. Vision screening for correctable visual acuity deficits in school-age children and adolescents. Cochrane Database of Systematic Reviews 2018; Issue 2. Art. No.: CD005023.
21. Forbes H, Sutton M, Edgar DF, et al. Impact of the Manchester Glaucoma Enhanced Referral Scheme on NHS costs. BMJ Open Ophthalmology 2019; 4:e000278.
22. Gunn PJG, Marks JR, Konstantakopoulou E, et al. Clinical effectiveness of the Manchester Glaucoma Enhanced Referral Scheme. British Journal of Ophthalmology 2019; 103: 1066-1071.
23. Hancock B, Shah R, Edgar DF, Bowen M. A proposal for a UK Dementia Eye Care Pathway. Optometry in Practice 2015; 16: 71-76.
24. Harper R, Creer R, Jackson J, et al. Scope of practice of optometrists working in the UK Hospital Eye Service: a national survey. Ophthalmic & Physiological Optics 2016; 36: 197-206.
25. Harrington S, Breslin K, O'Dwyer V, et al. Comparison of amblyopia in schoolchildren in Ireland and Northern Ireland: a population-based observational cross-sectional analysis of a treatable childhood visual deficit. BMJ Open 2019; 9:e031066.

26. Hawley C, Albrow H, Sturt J, Mason L. UK Eye Care Services Project Phase One: Systematic review of the organisation of UK eye care services. September 2010 (revised February 2011). Available from: college-optometrists.org
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28. Hawley C, Roberts C, Fosdick T. Visual impairment and road safety: Analysis of UK road casualties and contributory factors. Report for the College of Optometrists. June 2015. Available from: college-optometrists.org
29. Konstantakopoulou E, Edgar DF, Harper RA, et al. Evaluation of a minor eye conditions scheme delivered by community optometrists. BMJ Open 2016; 6:e011832.
30. Konstantakopoulou E, Harper RA, Edgar DF, et al. A qualitative study of stakeholder views regarding participation in locally commissioned enhanced optometric services. BMJ Open 2014; 4: e004781.
31. Konstantakopoulou E, Harper RA, Edgar DF, et al. Clinical safety of a minor eye conditions scheme in England delivered by community optometrists. BMJ Open Ophthalmology 2018; 3: e000125.
32. McCullough S, Adamson G, Breslin KMM, McClelland JF, Doyle L, Saunders KJ. Axial growth and refractive change in white European children and young adults: predictive factors for myopia. Scientific Reports 2020 Sep 16;10:15189.
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34. McCullough SJ, O'Donoghue L, Saunders KJ. Six year refractive change among White children and young adults: Evidence for significant increase in myopia among White UK children. PLOS ONE 2016; 11: e0146332.
35. McCullough S, Saunders K. Visual profile of children who passed or failed the UK School Vision Screening Protocol. British and Irish Orthoptic Journal 2019; 15: 36-46.
36. Mason T, Jones C, Sutton M, et al. Retrospective economic analysis of the transfer of services from hospitals to the community: an application to an enhanced eye care service. BMJ Open 2017; 7: e014089.
37. O'Donoghue L, Kapetanankis VV, McClelland JF, et al. Risk factors for childhood myopia: findings From the NICER Study. Investigative Ophthalmology & Visual Science 2015; 56: 1524-1530.
38. Rowe F, Wormald R, Cable R, et al. The Sight Loss and Vision Priority Setting Partnership (SLV-PSP): overview and results of the research prioritisation survey process. BMJ Open 2014; 4: e004905.
39. Shah, R, Hancock B, Bowen M, Edgar DF. Dementia and optometry: a growing need. Optometry in Practice 2017; 18: 177-186.
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41. Shickle D, Farragher TM, Davey CJ, Slade SV, Syrett J. Geographical inequalities in uptake of NHS funded eye examinations: Poisson modelling of small-area data for Essex, UK. Journal of Public Health 2018; 40: e171-e179.
42. Shickle D, Todkill D, Chisholm C, et al. Addressing inequalities in eye health with subsidies and increased fees for General Ophthalmic Services in socio-economically deprived communities: a sensitivity analysis. Public Health 2015; 129: 131-137.
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Appendix 3: The College of Optometrists Postgraduate Scholars Survey 2019

Survey questions and summary of responses (September 2019)

Response rate:

- Survey sent to 62 verified, completed Postgraduate Scholars (PhD awarded 1980-2019)
- 50 responses; 50/62 = 81% response rate

Survey questions and summary of responses

Q1. What is your name?	
43/50 answered [Free text response]	
Q2. What is your sex?	
49/50 answered	
Female	59.18%
Male	38.78%
Prefer not to answer	2.04%
Q3. Please describe your race/ethnicity. The categories below were used for the 2011 Census in England & Wales.	
49/50 answered	
White British / English / Welsh / Scottish / Northern Irish	77.55%
White Irish	4.08%
White Gypsy or Irish Traveller	0.00%
Any other White background	4.08%
Mixed White and Black Caribbean	0.00%
Mixed White and Black African	0.00%
Mixed White and Asian	0.00%
Any other Mixed / Multiple ethnic background	0.00%
Asian / Asian British – Indian	8.16%
Asian / Asian British – Bangladeshi	0.00%
Asian / Asian British – Pakistani	0.00%
Asian / Asian British Chinese	2.04%

Any other Asian background	0.00%
Black / African / Caribbean / Black British – African	0.00%
Black / African / Caribbean / Black British – Caribbean	0.00%
Any other Black / African / Caribbean background	0.00%
Other ethnic group – Arab	0.00%
Other ethnic group - Any other ethnic group	2.04%
Don't know	0.00%
Prefer not to say	2.04%

Q4. What is your current place of employment and job title? Please include all current full- or part-time roles and self-employment or retirement if applicable. If you are currently a student, please indicate what you are studying.

48/50 responded [Free text response]

Analysis of responses:

Academic/ Research	56.25%
Optometrist (independent, multiple, locum)	22.92%
Hospital Eye Service	20.83%
Combination of 2 of the above categories	6.25%

Q5. Which of the following professional activities (if any) have you undertaken since completing your Postgraduate Scholarship? Please include activities during your current and previous position(s) and select all that apply.

49/50 responded (NB: percentages relate the number of respondents for each answer choice)

	CURRENTLY	PREVIOUSLY	TOTAL RESPONDENTS
Assessment (Scheme for Registration)	66.67%	66.67%	6
Author of textbook(s)	64.29%	42.86%	14
Author of CET / CPD articles	66.67%	52.78%	36
Clinical practice	85.42%	47.92%	48
Delivering CET / CPD lectures	87.10%	35.48%	31
Examining (OSCE)	84.21%	31.58%	19
Managing services (planning, resources, people, performance)	93.10%	31.03%	29

Member of Local Optical Committee	50.00%	60.00%	10
Research	70.00%	52.50%	40
Senior administrative role	95.45%	31.82%	22
Supervising PhD students	82.61%	30.43%	23
Supervising pre-registration optometrists	64.29%	42.86%	14
Teaching – Undergraduate	65.85%	58.54%	41
Teaching – Postgraduate	76.32%	47.37%	38
Other [Free text response]:	18.37%		

Q6. Since completing your Postgraduate Scholarship, do you currently, or have you previously, held any of the following academic and/or research roles? Please include both full- and part-time roles and select all that apply.

44/50 responded

	CURRENTLY	PREVIOUSLY	TOTAL RESPONDENTS
Assistant Lecturer / Demonstrator / Teaching Assistant	16.13%	90.32%	31
Associate Professor	40.00%	60.00%	5
Clinical Lead Optometrist	62.50%	37.50%	8
Dean of Faculty	100.00%	0.00%	2
Early Career Fellow	0.00%	100.00%	9
Emeritus Professor	0.00%	0.00%	0
Head of Department / School	71.43%	42.86%	7
Lecturer / Clinical Lecturer	51.85%	59.26%	27
Principal Investigator	55.00%	60.00%	20
Professor	100.00%	11.11%	9
Pro-Vice-Chancellor	0.00%	0.00%	0
Reader / Principal Lecturer	37.50%	62.50%	8
Research Assistant / Associate	23.08%	92.31%	13
Research Fellow	13.33%	86.67%	15

Research Scientist	35.71%	85.71%	14
Senior Lecturer	53.33%	53.33%	15
Teaching Fellow	33.33%	66.67%	3
Other [Free text response]: Other [Free text response]:	15.9%		

Q7. Which institution awarded your PhD?	
48/50 responded	
Anglia Ruskin University / Anglia Polytechnic	6.25%
Aston University	12.50%
University of Bradford	16.67%
Cardiff University	22.92%
City, University of London	18.75%
Glasgow Caledonian University / Glasgow Polytechnic	4.17%
University of Plymouth	0.00%
University of Manchester / UMIST	8.33%
Ulster University	4.17%
University of Portsmouth	0.00%
Other [Free text response]:	3 responses: Queen's University Belfast; University of Nottingham; Oxford University

Q8. When was your PhD awarded (in which year)?	
48/50 responded [Free text response]	
Analysis of responses:	
2010s	41.67%
2000s	25.0%
1990s	25.0%
1980s	8.30%

Q9. Which type(s) of research did you undertake as part of your Postgraduate Scholarship? Please select all that apply.		
49/50 responded		
Basic research	40.82%	
Translational research	16.33%	
Laboratory-based research (including genetics, cell biology, microbiology)	12.24%	
Clinical patient-based research	75.51%	
Research on new optometry techniques or practice	30.61%	
Research on improving quality of care / surgical audit	4.08%	
Research on understanding disease incidence, prevalence, and progression (epidemiology)	18.37%	
Other type(s) of research	(please specify)	
[Free text response]:	1 response	

Q10. Which key words or themes apply to the research you completed as part of your Postgraduate Scholarship (PGS), and/or to research completed since completing your Scholarship? Please select all that apply.			
47/50 responded			
	KEY WORDS / THEMES PGS RESEARCH	KEY WORDS / THEMES POST-PGS RESEARCH	TOTAL RESPONDENTS
Optometry	90.24%	58.54%	41
Ophthalmology	78.26%	69.57%	23
Optics	56.25%	75.00%	16
Ocular imaging	29.41%	82.35%	17
Age-related macular degeneration	46.15%	69.23%	13
Amblyopia	57.14%	71.43%	7
Astigmatism	66.67%	44.44%	9
Cataract	44.44%	77.78%	9
Childhood-onset eye disorders	83.33%	66.67%	12
Colour blindness	0.00%	100.00%	1

Corneal and external eye diseases	80.00%	60.00%	5
Diabetic macular oedema	100.00%	0.00%	1
Diabetic retinopathy	50.00%	50.00%	8
Eye flashes and floaters	0.00%	0.00%	0
Glaucoma	63.64%	63.64%	11
Hyperopia	72.13%	45.45%	11
Inherited retinal diseases	0.00%	100%	1
Keratoconus	66.67%	66.67%	3
Low vision	40.00%	60.00%	10
Myopia	80.00%	66.67%	15
Neuro-ophthalmology	20.00%	80.00%	5
Ocular cancer	0.00%	0.00%	0
Ocular hypertension	33.33%	100%	3
Ocular inflammatory diseases	0.00%	0.00%	0
Presbyopia	33.33%	66.67%	9
Refractive error and ocular motility	87.50%	62.50%	16
Retinal detachment	0.00%	0.00%	0
Strabismus	75.00%	50.00%	4
Uveitis	0.00%	0.00%	0
Vitroretinal and ocular trauma	0.00%	0.00%	0
Machine vision	0.00%	100.00%	1
Psychophysics	70.59%	64.71%	17
Biomechanics	33.33%	83.33%	3
Visual neuroscience	60.00%	70.00%	10
Vision science	84.21%	73.68%	19
Visual rehabilitation	0.00%	100.00%	6

Visual disorders in special needs patients	80.00%	60.00%	5
Retinal degeneration and ageing	80.00%	80.00%	5
Structural biophysics	50.00%	50.00%	2
Structural and functional investigation of the visual system	78.57%	78.57%	14
Other (please specify)	[Free text response]: 9 responses: Contact lens-based mathematical modelling of the correction of higher-order aberrations; visual stress coloured filters; PGS: ocular-motor control / neurology and the relationship of neurological disease and eye movement control; binocular vision; infant visual and refractive development; ocular nutrition; contact lenses; PGS: diagnostic accuracy / Current: behavioural neuroscience, electrophysiology		

Q11. Which of the following skills, knowledge, or experience did you gain or improve as a result of undertaking your PhD? Please include both research and transferable skills, knowledge or experience gained.

48/50 responded

Analytical skills	91.67%
Applying for grants / funding / proposal writing	52.08%
Collaborating with others outside of academia	45.83%
Communication skills	85.42%
Critical thinking skills	91.67%
Dedication and perseverance	87.50%
Financial management / budgeting skills	18.75%
People management skills	29.17%
Problem solving skills	83.33%
Project management skills	70.83%
Presentation / public speaking skills	91.67%
Research skills within optometry / vision science / your discipline	93.75%
Research skills outside of optometry / vision science / your discipline	56.25%
Self-confidence	68.75%
Teaching	81.25%

Team working skills	50.00%
Technical skills (e.g. IT, equipment, software, etc.)	75.00%
Time management skills	66.67%
Writing for academic audiences	83.33%
Writing for non-academic audiences	43.75%
Don't know	2.08%
Other (please specify)	[Free text response]: 2 responses

Q12. To date, how many papers have you published in refereed journals and/or how many oral or poster presentations have you made at conferences? Please include only work of which you are an author or co-author (not submitted or accepted material).

46/50 responded [Free text response]

Analysis of responses:

Answers ranged from 1 – 250 papers

1-10 papers	63.04%
11-50 papers	15.22%
51-100 papers	10.87%
>100 papers	10.87%

Answers ranged from 0 – 500 presentations

0-10 presentations	56.52%
11-50 presentations	23.91%
51-100 presentations	6.52%
> 100 presentations	13.04%

Q13. Have you had material DIRECTLY related to your College-funded PhD published in peer reviewed journals or presented at national conferences?

46/50 responded

Yes	89.13%
No	8.70%

Don't Know	2.17%	
[Free text response]:	34 /46 respondents provided further detail on research outputs directly related to the PGS.	
Analysis of free text responses:		
1 – 5 outputs directly related to PGS	34.78%	
6 – 10 outputs directly related to PGS	23.91%	
> 10 outputs directly related to PGS	15.21%	

Q14. Have you received research funding (other than the Postgraduate Scholarship) from any of the following sources? Please include funding from when you were doing your PhD to today (if still in research), or up to the point you left research (if you left research). Please select all that apply.

41/50 responded	
Institution where I completed my PhD	29.27%
Institution where I completed other research	21.95%
BBSRC - Biotechnology and Biological Sciences Research Council	2.44%
ESRC - Economic and Social Research Council	4.88%
EPSRC - Engineering and Physical Sciences Research Council	2.44%
Innovate UK	4.88%
MRC - Medial Research Council	7.32%
NERC - National Environment Research Council	0.00%
STFC - Science & Technology Facilities Council	2.44%
UK educational / scientific charity (e.g. Wellcome Trust, Macular Society, Fight for Sight, International Glaucoma Association, College of Optometrists)	43.90%
Non-UK educational / scientific charity	21.95%
National Institute for Health Research (NIHR)	12.20%
Other UK funding body (e.g. Academy of Medical Sciences)	4.88%
EU / EC funding body (e.g. Horizon 2020)	2.44%
Non-UK or EU funding body (e.g. National Institutes of Health)	7.32%
Local funding body	17.07%

My employer (or former employer)	19.51%
Other competitively funded scholarship or award (please provide details below)	12.20%
I have not received additional funding for research	14.63%
Other [Free text response]:	14 responses, 6/14 (42.86%) received industry funding

Q15. Have you ever received additional research funding for research DIRECTLY related to / following on from your College-funded Postgraduate Scholarship?

45/50 responded

Yes	24.44%
No	75.56%

If Yes, please indicate the source(s) of the funding you received. [Free text response]:	11 responses, 10/11 {90.10%) from UK charities, research councils or other UK funders

Q16. Do you currently, or have you previously, held any of the following roles (either remunerated or non-remunerated)?

47/50 responded

Peer reviewer	61.70%
Editorial Board member (of a peer reviewed journal)	25.53%
Associate Editor (of a peer reviewed journal)	8.51%
Editor-in-Chief (of a peer reviewed journal)	0.00%
Panel or sub-panel member for the Research Excellence Framework (or the former Research Assessment Exercise)	4.26%
Research, Funding and / or Scholarship Committee member	14.89%
None of the above	36.17%
Other professional role / activity related to research (please specify)	12.77%
[Free text response]:	6 responses, 3/6 (50%) related to university leadership roles

Q17. Have you ever received any honours or awards for research, teaching, clinical practice, or another professional activity? This includes prizes, life fellowships, and New Year / Queen's Birthday Honours, etc. Please note, you will have the option to attach your CV at the end of this survey.

Answered 46/50

Yes	43.48%
No	56.52%

If Yes, please list awards and honours. [Free text response]:	18 responses; 7/18 (38.9%) College Research Excellence Awards; 4/18 (22.22%) Worshipful Company of Spectaclemakers Awards

Q18. Have you participated in any of the following policy influencing activities? Please select all that apply. In the free text box please enter any activities not listed below and include details of those DIRECTLY related to your Scholarship.

42/50 responded	
Been cited in policy documents and reviews	14.29%
Given advice (formally or informally) to government departments	19.05%
Spoken at events with policymakers or other senior officials	19.05%
Provided evidence to government reviews, inquiries, committees, and forums, informing stakeholders, government, and industry	9.52%
Served as a member of a committee or working group, providing advice to government departments, service commissioners and healthcare leaders	21.43%
Participated in advisory committees and national consultations	28.57%
Advised and contributed to clinical governance, influencing key healthcare services, non-NHS organisations and companies	7.14%
Other (please list in the box below)	0.00%
None - I have not participated in policy influencing activities.	57.14%
Please specify if any of the policy influencing activities were directly related to your postgraduate scholarship. [Free text response]:	6 responses

Q19. Have you participated in any of the following clinical practice influencing activities? Please select all that apply. In the free text box please enter any activities not listed below and include details of any DIRECTLY related to your Scholarship.

45/50 answered	
Submitted evidence to inform the development of local or national clinical guidelines	22.22%
Been cited in local or national clinical guidelines	15.56%
Contributed to / been cited in national clinical guidelines	13.33%
Spoken at CET / CPD conferences or events	64.44%
Contributed to / been cited in curriculum programmes run by higher education institutions	33.33%
Participated in clinical reviews to help inform and influence clinical practice	22.22%
Contributed to / been cited in systematic reviews (updates to reviews of the current evidence base to inform policy and decision making)	28.89%

Other (please list in the box below)	0.00%
None - I have not participated in any clinical practice influencing activities.	24.44%
Please specify if any of clinical practice influencing activities were directly related to your postgraduate scholarship. [Free text response]:	9 responses

Q20. Have you participated in any public engagement activities? Please select all that apply. In the free text box please enter any activities not listed below and include details of any DIRECTLY related to your Scholarship.

45/50 responded

Talks and discussions to public audiences (not academic or government or eye health sector)	40.00%
Festivals and celebrations	13.33%
Collaborative or co-produced research or teaching	31.11%
Outreach with schools and teachers	40.00%
Blogs and social media outreach	17.78%
Radio, television, or podcast appearances	28.89%
Citizen Science	2.22%
Other (please list in the box below)	2.22%
None - I have not participated in any public engagement activities.	28.89%
Please specify if any public engagement activities were directly related to your postgraduate scholarship. [Free text response]:	7 responses

Q21. Do you believe that your research (directly related to your Postgraduate Scholarship, or otherwise) has had a direct impact on patient care (for example, changing the course of patient care)?

45/50 responded

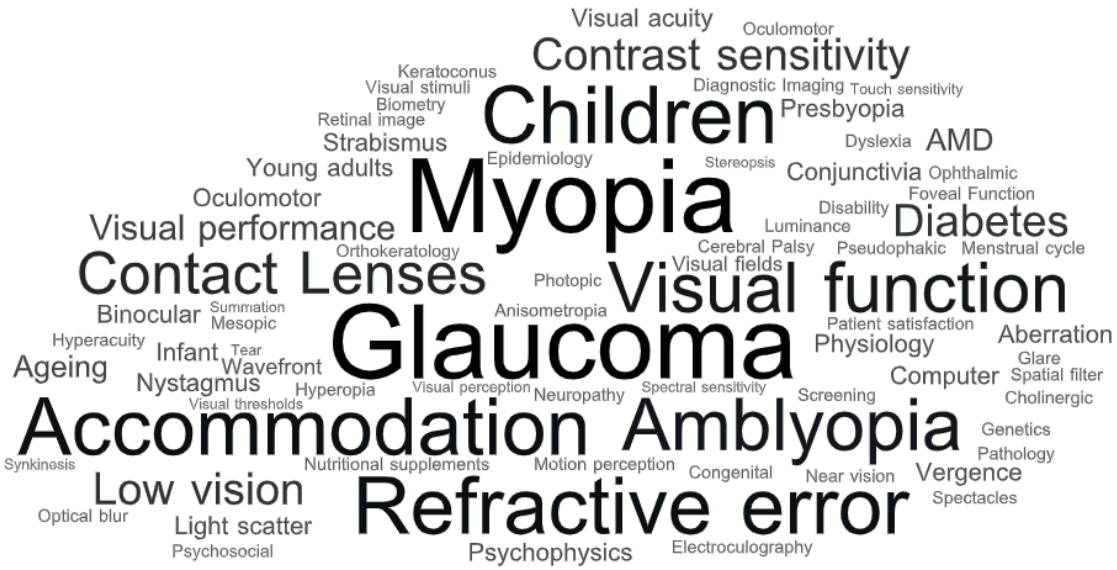
Yes	28.89%
No	33.33%
Don't know	37.78%

If Yes, what was the impact of your research on patient care? [Free text response]:	14 responses

Q22. Is there anything else you would like to say about the impact of the Postgraduate Scholarship on your skills and knowledge, research, or career?		
42/50 responded		
Yes	47.62%	
No	50.00%	
If Yes, please provide further information here. [Free text response]:		21 responses

Q23. Is there anything you would like to say about the impact of the College's Postgraduate Scholarship programme on national (UK) or international optometric research in general? We welcome all comments and views on the College's scholarships.		
43/50 responded		
Yes	39.53%	
No	60.47%	
If Yes, please provide further information here. [Free text response]:		17 responses

The most common areas of PhD research by scholars:



The College of Optometrists
42 Craven Street
London
WC2N 5NG

020 7839 6000
college-optometrists.org

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